INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Published Online: *16* March 2023 Vol 13, Issue 3, (2023) E-ISSN: 2222-6990

Defence Industry in Malaysia: Learning from the Past, Enhancing the Present and Synergizing the Future of Defence Industrialization

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Abstract

Achievement and development of defence industrialization for a country have their own story based on the nation's plans in the past, the success achieved in the present, and the direction and continuous aspirations planned for its future formation. Similarly, as most countries prioritise their industrial defence base to strengthen the capabilities of their national armed forces, Malaysia is also not left behind. The country aspires to have a sustainable and reliable defence industry to support the aspirations to defend its nation's sovereignty. This paper is a study based on a conceptual analysis of the formation and development of the defence industry in Malaysia that has been implemented in the past, present and future. This paper uses a qualitative research approach that includes collecting data based on a literature review of the defence industry in Malaysia and globally, examining related national policies, interviewing significant individuals in the industry and making observations on the facilities of the local defence industry. As a result, this study will present a conceptual analysis of the formation and development of the defence industry in Malaysia in the past, present and future.

Keywords: Defence Industry, Sustainable, Reliable, Conceptual Analysis.

Introduction

Increasingly, numerous emerging countries are developing and investing in their defence industries. As argued by Kurc & Neuman (2017), producers and suppliers in the defence industry have grown, and industrial collaboration promises to integrate defence industries worldwide. Also, Hooke et al (2005) mentioned that since World War 2, most countries had developed the idea that a significant security policy feature was the Defence Industrial Base (DIB). Countries generally maintain their defence industries to preserve national sovereignty from security threats. Hence, producing tanks and fighter jets has become more crucial than buses or cars. The lesson learnt from the experience of a lack of logistics support during the Cold War era has made the security factor a primary priority for the country. Therefore, Governments, military planners, and defence companies mobilise and work together to plan for precise military asset needs, long-term use, and stable development.

In addition, according to Dos Reis (2021), various motivations exist for countries to industrialise their defence industry after the post-Cold War. On one side, it sees the ability of the industry as the main instrument to defend the country's sovereignty and strengthen its foreign policy. But, on the other side, they are also under tremendous pressure to maintain the industry's ability to guarantee efforts to prepare for the uncertainty of war, which is heightened by the constraints of tight budgets and uncertain timelines.

It is fair to conclude that the global defence industry had a significant turning point and began after the Cold War. The world's most enormous powers, such as the United States of America, most European countries, Russia, China, India and Japan, have placed their respective defence industries as their primary agenda. Major world powers have entered into agreements towards transnational defence for technology sharing and expertise, creating a broader supply chain and collaborating with other international firms (Hayward, 2000).

Among others, the defence industry's role is to strengthen a country's strength and prestige through developing and producing high technology and highly skilled jobs. The ability of the defence industry has a significant influence on the operational capacity of an armed force to ensure that national security is always maintained, as well as to determine that national security remains guaranteed and re-establish the strategic role of the defence industry to develop and improve the national economy (Anghel & Vasilescu, 2018).

Since independence, Malaysia has prioritised its security and defence production (Mohamed et al., 2020). As a newly independent country in Southeast Asia, Malaysia faces numerous challenges that interfere with national sovereignty. Internal challenges such as communist influence uprisings, ethnic disputes, political turmoil, racial strife, and the unity dilemma have all aided the growth and modernisation of the Malaysian Armed Forces (MAF). It can be said that, due to these security threats, Malaysia was motivated to actively develop its military after the Cold War (Mustapa et al., 2020).

The development of the logistical aspect of the MAF is part of implementing the nation’s defence policy (Keling & Mohamad, 2016). Implementing Malaysia's defence industry policy is also seen as based on the principle of self-reliance (Balakrishnan, 2008). MAF is purchasing its defence equipment through a transfer of technology programs. Among the defence equipment or systems for the Royal Malaysian Navy are the modern warship and Scorpene submarines. Then the Royal Malaysian Air Force purchased the fighter aircraft used by many developed countries, such as the MiG-29, FA/18 Hornet, and Sukhoi 30MKM. And the Malaysian Army acquired the main battle tank Pendekar from Poland. In this case, defence procurement and offsets programs are one of the strategies of the government to boost local capability and capacity through transfer of technology process. To successfully actualise this strategy, Malaysia's defence industry receives a significant amount of financial and human capital from the government.

For this purpose, the government has spent significant allocation to provide modern logistics equipment to the security forces for use to its full potential. The defence and MAF have evolved with technological advancements through the defence policy and current military logistics doctrine. Implementing a solid defence industry may provide a high and optimal impact on the readiness of the MAF. Henceforth, the real question now is whether the

government and defence industry players have done enough to prepare and strengthen the capability of the MAF and establish a long-term plan for the sustainability of the Malaysian defence industry.

In reality, there is still much room for improvement in Malaysia's military growth. Although struggling with tight budget allocation and a frugal financial situation, to strive for the challenges, Malaysia has established a range of defence doctrines, including Total Defence, to deal with emerging security dangers that were frequently unforeseen and unpredictable (Malaysian Institute of Defence and Security, 2013). The Total Defence principle was first implemented in May 1986. It is a strategy that outlines all assets and national resources to improve national capacity to meet any domestic or foreign threat. For example, activating the Territorial Army (TA) as the community voluntarily in the Military Reserve Force of MAF to assist the permanent members is in line with the Total Defence concept implemented in National Defence Policy (Zuber et al., 2021). The deployment of reserve forces and other security teams in any associated company is one of the most noticeable characteristics of the total defence model.

The development and modernisation of the MAF are a long-term strategic plan and a need for a nation's growth to meet the demand for defence, primarily to ensure the country's safeguard and sovereignty. Henceforward, Malaysia introduced the National Defence Policy in 2010 and published its first Defence White Paper in 2020. Both national documents have been issued to demonstrate government commitments to continue strengthening national defence and armed forces modernisation and the government's firm commitment to strengthening national defence, respectively. In that context, Keling et al (2011) reiterated that the development and modernisation of the MAF are necessary for a country's growth in meeting security needs, especially to guarantee the security and sovereignty of the country.

In order to achieve the country's aspiration to develop and modernise its military equipment and weapon systems, the enhancement of local defence industry capability and ability is seen as a long-term measure to actualise the strategy. According to Hartati et al (2014), the defence industry is a national (government or private) industry whose products, individually or in groups, include maintainability and repair services. The government assesses whether the sector will benefit the state defence order or part of the national industry. In particular, the ability or potential to develop and produce products such as weapon systems, equipment, and other defence-related products to support the defence industry. The defence industry, also known as the military industry, comprises government and commercial companies that work on research, development, manufacturing, and maintenance of military equipment and facilities. The military sector contributes to the nation's defence by promoting and improving facilities and technology, including defence equipment.

From a global perspective, the business of weapons and military products in the united states and most european countries has dominated this defence industry sector. The industry in the US and European countries is a multibillion-dollar industry that produces firearms, military technology, and equipment worldwide. It involved commercial companies that work on military material, equipment, and facilities for research, development, production, and operation. Weapon manufacturing firms, also known as defence contractors or the military industry, manufacture arms primarily for state armed forces. However,

government agencies also participate in the arms trade, purchasing and selling firearms, munitions, and other military hardware. In addition, weapons, ammunition, missiles, military aircraft, vehicles, ships, electronic devices, and more are available. Also, the arms industry spends extensively on research and development (Blum, 2019).

In the future, with strategic and extensive planning to ensure effective implementation involving all related stakeholders in the Malaysian defence industry, the country can build the capacity to become a defence producer for both domestic needs and the international market. In addition, establishing a booming local defence industry will create employment and generate income to support economic growth via the multiplier effect. Therefore, Malaysia must have a robust defence industry and be there to produce product solutions, not just to contribute to the economic dimension, which is job creation, export, revenue, etc., but also to see the local defence industry take a much more significant role in supporting the MAF. It is almost like a strategic partner to MAF in helping the development of its capability. In the end, the future of the national defence industry is essential to achieving a safe, sovereign and prosperous Malaysia.

Objectives

The objectives of this article are to analyse and discuss the following matters:

- The genesis of the Malaysian defence industry from motivation to actualising the national effort. Hence, the discussion follows through the beginning process to examine the process of defence industrialisation formation in Malaysia.
- To analyse the government's and the industry's enhancement of current defence industrialisation to be more competitive in the local and global market.
- To highlight opportunities and potential for future growth and improvement of the industry.

The objectives above will be discussed to examine, analyse and highlight a new approach for defence industrialisation according to the Malaysian government to be more competitive in the global market, as well as actualising the country's aspiration for self-reliance.

Methods and Materials

This study uses a qualitative methodological approach through a literature review based on industrial development, particularly the defence industry in Malaysia and globally. This paper also conducts an interview session with key and significant personalities in the local defence industry, examining national defence policies and planning action plans for the defence industry. In addition, the study's results were also obtained through observations carried out during visits to the areas of local industry players in the country.

Findings and Discussion

As Balakrishnan & Matthews (2009) discussed, Malaysia began to recognise the need for local defence industrialisation during the post-independence era. During that era, the Malaysian government intended to create a reliable and credible defence industry to provide first-line logistical support to the MAF. The need for local defence industrialisation is based on sovereignty and increasing efforts to achieve strategic and foreign policy objectives. Development for Army, Air Force and Navy services is not well coordinated with essential

equipment and military assets fulfilled by respective services. The requirement is also for military support maintenance, repair and overhaul (MRO).

The Past

Balakrishnan (2008) argued that before Malaysia's independence in 1957, the country's industrial development program was believed to be very inactive. British companies mostly handled all logistics resources in the MAF during that era, and a tiny number were by Chinese companies. However, after the independence era, the Malaysian government encouraged the development of the defence industry by introducing various initiatives. For example, in the 1960s and early 1970s, the government adopted the Import Substitution Industrialisation (ISI) strategy. This situation is a national strategy focusing on heavy industry to diversify and deepen the country's industry by expanding more local companies, small and medium-sized Bumiputera-owned and capable in indigenous technology (Kanapathy, 2019). However, this strategy failed due to domestic market saturation and could not penetrate the export market.

Later in 1972, the Ministry of Defence (MOD) Malaysia established the Defence Industry Division (DID) to monitor the defence industry development in Malaysia. This division has played an active role in promoting the defence sector locally and globally. In this regard, the government has focused significantly on three industries: aerospace, maritime and ordnance equipment with defence production. The supply of small arms and ammunition, hand grenades and pyrotechnics by Syarikat Malaysia Explosive (SME) Ordnance in 1972 and the conduct of MRO for aeroplanes by AIROD in 1976 are the defence industry services provided to MAF (Zulbasri et al., 2019). However, the implementation of the defence industry is minimal, and there is no production of significant assets.

Henceforward, in the late 1970s, *Perkembangan Istimewa Angkatan Tentera* (PERISTA) program was launched. The purpose of PERISTA is as a modernisation measure of MAF with the purchase of assets from abroad aimed at developing the country's defence industry and enjoying the benefits of technology transfer in addition to efforts to curb enemy threats (Mohamed et al., 2020). Among the acquisitions of strategic and high-impact military assets are armoured vehicles (Condor and Sibmas), aircraft planes (Skyhawk and Tigereye) and naval ships (Corvette ship and Mahamiru class ship) (Lee, 2007). However, the government had to adjourn the program due to the country's economic recession in the mid-1980s (Balakrishnan, 2008).

Later on, the overall industrialisation of the country in the 1980s promised a better industrial climate. The industrial environment got better when the government launched a second ISI strategy. At the national level, the government has focused on heavy industrialisation, such as the production of automotive products (The national car project and motorcycle engine plants), metal (iron and steel) industry, cement industry, petrochemicals industry, and wood (pulp and paper) industry. At the MOD level, the National Defence Production Policy (NDPP) was introduced in 1982 to provide a better direction for the planning of the national defence industry (Balakrishnan & Matthews, 2009; Zulbasri et al., 2019). In general, the production and responsible of strategic defence assets are by the government-owned subsidiaries.
Meanwhile, the productions of essential and non-strategic defence goods are by semi-government and private sector companies. Alas, the country's economic recession in the middle 1980s reduced defence spending, and consequently, NDPP efforts were stalled. Due

to this situation, MAF focuses only on asset life extension programs within the available budget by carrying out upgrades and overhauls of certain assets. As a result, much of the capability of the defence industry is still low and involves heavily MRO activities only. Moreover, equipment assembly in the country is minimal, with cooperation and production with licensed manufacturing companies (Balakrishnan & Matthews, 2009).

In the 1990s, the national defence industry became more progressive and began to take off (Zulbasri et al., 2019). In addition, the development of the country's defence industry is overgrowing due to a push factor from the Prime Minister of Malaysia himself, who provided support by increasing the defence budget and continuing the PERISTA program, which was previously put on hold by the former administration (Balakrishnan, 2008). The Malaysian government then began acquiring more weapons systems from abroad due to Malaysia's high-security needs and widespread demand for defence privatisation. This situation has directly intensified the defence industry activities in Malaysia (Balakrishnan & Matthews, 2009).

Apart from the push factor mentioned above, there are also pull factors that influence the development of the national defence industry. Malaysia sees many developing countries also increase the capabilities of their defence industries and have been more advanced going forward. Countries such as Turkey, Brazil, and India produce their platforms, and Indonesia and South Korea actively create weaponry systems. Even the neighbouring country, Singapore, has increased MRO capabilities and has become an aerospace service centre for the Asian region. Therefore, Malaysia does not want to be left behind in defence industrialisation by making significant investments. The national defence industry aspires to stand at the same level as other countries and be self-reliant on manufacturing national defence assets (Balakrishnan, 2008).

The commercial industry in Malaysia is developing very rapidly in this era. With this rapid development, the government has attracted several large companies, such as DRB-HICOM and Sapura Telecommunications, to participate in the defence sector. These large companies have the advantage of having the capability, facilities and expertise to produce equipment and provide services to the MAF. The government sees this situation as a commercial strategy and dual-use technology that benefits both parties. Large corporations' simultaneous involvement in the public and defence sectors can also reduce production costs, especially in the face of economic recession. At the same time, the MAF requirements are too small to develop its facilities solely for the production of defence equipment. Therefore, the government has focused on automotive and aerospace as high-impact areas in the civil and defence sectors (Balakrishnan, 2008).

Throughout the 1990s to 2000s, Malaysia implemented a massive modernisation of the MAF to face any threat to the country. The Malaysian government focuses on increasing mobility and firepower, adding warships and aircraft. As a result, MAF has procured FA-18 Hornets, MIG-29N Fulcrum, Hawk MK108, SU30MKM42, Battle Tanks, PT-91M, Scorpene (Submarine), Astros II and G5 MKIII short-range missile launchers, Styer Sniper Gun and several other types of equipment for empowering the armed forces of the country on par with other countries (Keling et al., 2011). All of these acquisitions are part of the national offset program. MOD Malaysia and overseas suppliers have sealed many agreements to succeed in this program.

The implementation of the offset program aims to benefit from technology transfer, generating know-how expertise, joint development, and capabilities for local production and sub-assembly. In the end, the offset program adopted by the government has become the country's primary mechanism to promote Malaysia's defence industry in the future (Balakrishnan & Matthews, 2009).

From the 2000s onwards, the national defence industry was no longer focused only on MRO work and equipment supply but has grown and provided support in new sectors such as ICT, services, manufacturing and commodities. These changes have encouraged economic growth, acceptance of new local technologies, and increased industry efficiency. The development of the national defence industry can also promote and benefit other sectors such as electronics, oil & gas, logistics service providers and the automotive industry. In addition, implementing diversity in the defence industry can contribute to information sharing, increase R&D in the country, and solve issues on the country's military assets (Zulbasri et al., 2019).

The Present

The implementation of the country's local industry program has been guided and driven centrally by the Malaysian government. This new initiative includes the present execution of the national defence industry. This program is known as the Industrial Collaborative Program (ICP), launched in 2014, and the Ministry of Finance (MOF) Malaysia as the government representative, is responsible for this program. ICP is a program that involves activities that will add value to a procurement made by the government by considering cost-effectiveness. ICP includes the Economic Enhancement Program (EEP), Countertrade Program and Offset Program (Ministry of Finance Malaysia, 2018).

The Malaysian Defence Industry Council (MDIC) was established in August 1999 through a Cabinet decision to coordinate the development of the defence industry sector in Malaysia. MDIC supports the development of local industry, facilitates overseas marketing, and helps companies access foreign markets. The Minister of Defence will chair the MDIC and membership by various government agencies and semi-government and defence industry companies under the auspices of the MDIC. The focus of MDIC is to plan the development of the defence industry based on the objectives and interests set by the government. The council meets and discusses various issues and problems related to the national defence industry at least twice a year. The forum has produced numerous resolutions and policies for developing the national defence industry, including offset policy, long-term contracts and the national defence industry blueprint (Balakrishnan, 2008).

Later in March 2010, MDIC was restructured through cabinet approval with a scope that includes the membership of agencies and companies in the security sector and enforcement. In line with this structuring, MDIC has renamed the Malaysian Industry Council for Defence, Enforcement and Security (MIDES), and DID has been appointed as secretariat by the MOD. The objective of MIDES's establishment as a government initiative in producing and making the local defence industry independent and competitive is in line with the National Defence Policy requirements.

MIDES roles are pretty similar to their origin, DID. MIDES coordinate the defence industry's development direction, enforcement, and security. MIDES also discusses the issues and challenges faced by defence industry players, enforcement, and security agency. Besides that, MIDES also carries out its operational functions by auditing, monitoring, and ensuring that all members' development and technological expertise under MIDES will increase growth. MIDES comprises 56 government and private agencies such as the MOD, MOF, Ministry of Home Affairs (MOHA), SME Corp Malaysia, etc. MIDES has six sub-sectors or working groups: Automotive, Maritime, Aerospace, Cyber Security, Armament, and Common User. Two hundred ten local defence companies are members of MIDES as of January 2020 (Defence Industry Division Malaysia, 2021).

In 2022, MIDES renewed their organisational chart. Contrary to the previous chart, as of September 2022, the central organisation of MIDES is jointly chaired by the Minister of the MOD and the Minister of the MOHA, as shown in Figure 1 below. The latest organisation's membership comprises the Secretary-General of MOD and MOHA, the Chief of the Defence Force and the Inspector-General of Police. Meanwhile, the government identified seven (7) main sectors under MIDES: Automotive, Weapons, Maritime, Aerospace, ICT, Common User and Security and Enforcement. This sector has its working group and acts as the Main Secretary working group with 83 registered local companies (Defence Industry Division Malaysia, 2022).

Currently, various efforts are being taken by the government, especially under the MOD, to enhance the national defence industry's capabilities and the MAF's strength. Based on the former Minister of Defence and the Prime Minister of Malaysia, the government will launch the National Defence Industry and Security Policy to make Malaysia a military asset producer by 2023. Cooperation and technology transfer with military asset producer countries such as The United States, China, Italy, and Turkey rapidly implement it. These efforts can produce military assets, and the defence industry emerges as a future catalyst for a competitive and sustainable economy (Yaakob, 2021). This effort and commitment will continue as stated through the 2023 Mandate of the Minister of Defence, Malaysia, in which the MOD aims to launch the National Defence Industry and Security Policy, which will be a strategic document, as well as the ministry's comprehensive framework for the implementation of the national defence industry (Hasan, 2023). Malaysia had established cooperative relations with Turkey earlier by the former Prime Minister of Malaysia in 2019. The Turkish defence industry model is feasible for Malaysia and can produce its indigenous military products through local expertise (Say, 2019). This kind of strategic collaboration can boost the capabilities of the local defence industry to a higher and better level.

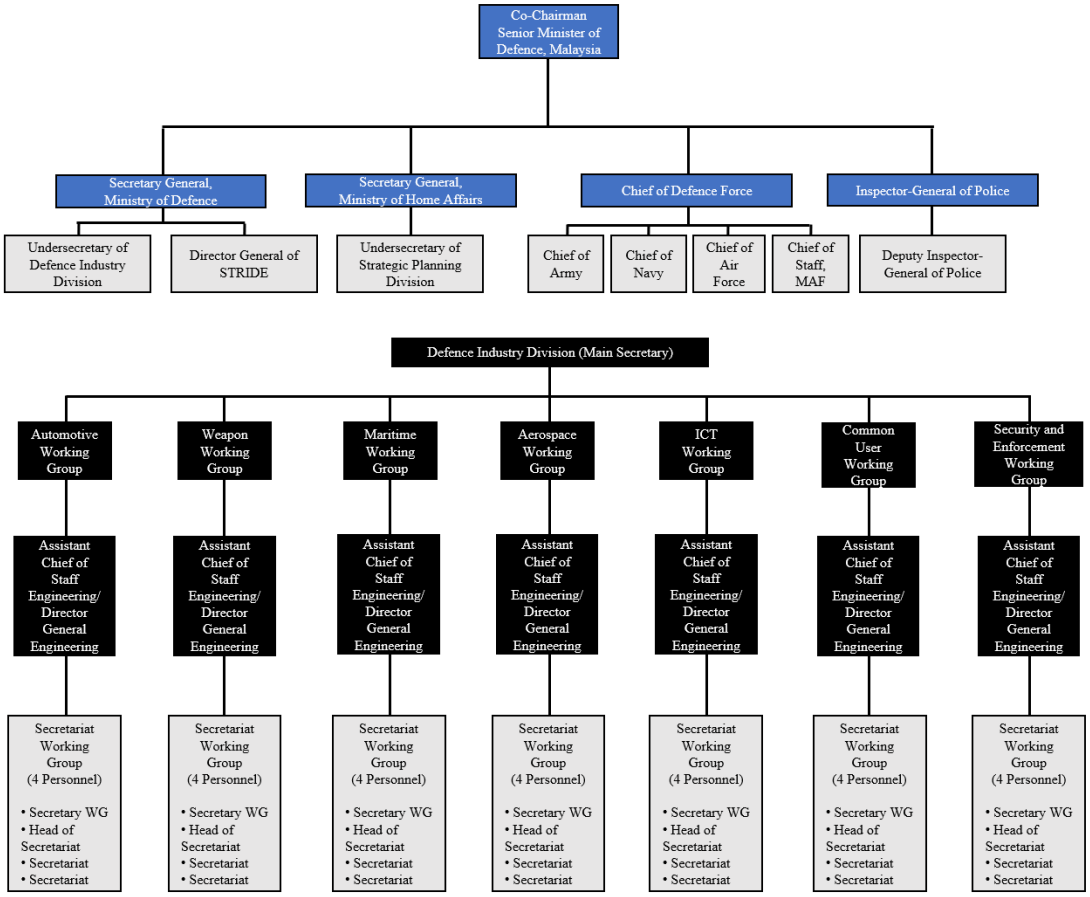

Figure 1 MIDES Organisation Chart (Defence Industry Division, 2022)

The Future

In future, the Armed Forces will rely more on technology. Wars in the future will be different due to technological changes from time to time. In line with the changes in technology, the armed forces need to adapt to the changes. Apart from military doctrine, changes in the logistics aspect also need to be given special attention. Before examining the future changes and reforms in the defence industry, changes in the logistics aspect must be seen first, as the logistics aspect of the armed forces is closely related to the country's defence industry.

The study conducted by Schutz & Stanley-lockman (2017) has offered a solution to the logistical problems faced by the armed forces based on new technologies. Effective logistics is essential for the entire military activity. Digitalisation and globalisation are no strangers to today's commercial world. Armed Forces can use this method to save time and energy resources and offer advantages to operations, especially distributing information faster and safer. Furthermore, the benefits of new technology can be used in the military environment to effectively and successfully implement all planning. Among the methods of logistical innovation that the armed forces can use in the future are as follows

a. Green Technologies.

There is no denying that fuel consumption during the First and Second World Wars was so great, especially when the movement of personnel and equipment from one location to another, whether on land, sea and air. Unfortunately, the use of so much fuel has

unknowingly polluted the environment. Among the green technologies that can reduce fuel consumption and preserve the environment are solar cells, hybrid electricity, methanol-based fuel cells, piezoelectricity (generating energy from motion), hydrogen energy (generating energy from water) and energy generation waste materials. Although developing power from green technology is much more expensive, long-term efforts and environmental conservation factors make this technology beneficial in the future. Therefore, green technology in the future is alternative energy and a substitute for existing energy sources.

b. Artificial Intelligence (AI) Systems. The integration system for the computer network covering the three branches of service (Army, Navy and Air Force) within the MAF still does not exist comprehensively. However, in the future, this integrated system will enable these three branches under MAF to share and exchange information, especially in logistics management. Artificial intelligence systems in this integration system will prioritise and manage logistics management more quickly and efficiently. For example, the system can identify spares for repair needs and relocate the items wherever needed. The transition from manual input to an automated system can increase efficiency, faster and more accurate information flow, especially for top leaders. Besides that, the system enhances the flexibility and responsiveness of logistics supply chains, improves service interoperability, and faster reaction in peace or war situations.

c. Additive Manufacturing. The use of spares, especially in equipment maintenance, is essential to ensure military assets are in deployable condition. Through additive manufacturing, the production of an item can speed up repairs and offer more dynamic and fast supply chain management. According to Engineering Product Design (2017), additive manufacturing creates 3D objects directly from a computer-generated model using successive layers of material. The benefits obtained from this method are the production of spares can ensure the readiness and mobility of combat units are high.

d. Robotics and Unmanned Systems. Using robotics and unmanned systems can save operating time, minimise inventory, and reduce manpower and danger to humans. In addition, this system is more flexible because the planning for the amount and size of cargo can be adjusted according to the drone's size and can go through various terrain conditions for the delivery of items to specific locations.

Tate Nurkin (2016) stated that the environment's uncertainty, complexity, and instability could affect the defence industry's strategic and long-term direction. However, with a substantial, solid, resilient and sustainable consolidation, the defence industry can survive for 5 to 10 years and possibly even beyond this period. Moreover, these elements' evolution and interconnectedness can drive the defence industry towards a more dynamic market and cooperative relationships and create new adventures that have not previously occurred in the defence industry environment. Therefore, below are listed five significant points that policymakers can use to plan new strategies to open up new opportunities and reduce risk as follows:

a. New Actors. The participation of new companies in the current tense defence industry environment is a healthy element. The industry needs a company that offers a more flexible business model, technology sharing and more attractive and secure financial

agreement terms. In addition, the company's ability to have dual-use technology in the defence, security and commercial sectors can provide a competitive advantage over other companies. Applying new technologies such as cyber/ICT domains, the use of new materials, unmanned systems, artificial intelligence, navigation and communication technology, big data analytics, and other new technologies can provide the best-added value to enhance the capability of the nation's armed forces. This finding coincides with the view of Research Participant 1, where he said that the ability of a local defence company to identify the niche area to become solid and competitive.

> *"…Competitiveness is about coming up with cutting-edge solutions and new knowledge, pricing, after-sales support, reliability of the product they produce."*
> (Research Participant 1, 2022)

b. New Technologies. The potential emergence of new and innovative technologies can change existing production methods more quickly, save production costs, and bring more success to a company. For example, additive manufacturing, synthetic biology manufacturing, and 4D printing can increase product production capacity and long-term use and significantly impact and improve industry activities. The finding is in line with Research Participant 2 thought that acquiring critical technologies in the industry will strengthen local R&D capabilities and technology transfer from foreign strategic partners.

> *"…Developing defence science, technology and industry will contribute to economic growth by reducing dependence on foreign defence assets, expanding and commercialising civilian products, promoting research and innovation and creating employment opportunities for the people."*
> (Research Participant 2, 2022)

c. New Frameworks. The threat and uncertainty of the current country's economic trends, geopolitics, demographics, immigration, sovereignty challenges, and climate change has impacted the military capability and the development of the local defence industry. Therefore, a new framework is needed to address the threat of current trends related to the national debt, slow growth, and mid-life crisis for the current market to influence the future of a country's defence industry. Therefore, Research Participant 2 shared his thought that the key to the more robust development of the Malaysian defence industry lies in concerted efforts involving other pertinent government ministries, agencies, experts, academia, NGOs and private sectors.

> *"…The commitment and effort of all relevant stakeholders are needed to make more significant inroads into the productivity of the local defence industry. The role and participation of the related ministries and agencies are hopefully included in the future and incoming National Defence Industry and Security Policy that will form a policy framework aimed at cultivating favourable long-term conditions to unleash the defence industry's full potential."*
> (Research Participant 2, 2022)

d. New Rules. New laws and regulations are needed to address counterfeiting, cyber security threats, corruption and potentially risky production materials in the defence industry

environment. In addition, the security of defence products, especially those with high innovation, needs to be taken care of so that future competition between companies can increase the actual capabilities in the defence industry. Therefore, several Research Participants have provided views on how this finding can improve capabilities and address challenges in the local defence industry. For example, Research Participant 3 said that the government is taking initial steps towards streamlining all defence industry players, especially challenges that arise between large and small companies. In addition, Research Participants 4,5 and 6 gave opinions to overcome the challenges faced concerning this matter.

> *"…The government is taking initial steps toward streamlining all defence industry players to be more advanced and prosperous in the local defence industry. A common practice in the national defence industry is competition between large and small companies, where small companies have no opportunity and often lose out to larger companies."*
> (Research Participant 3, 2022)

> *"…For every R&D project, whether a system, software or product, at least two companies are involved in creating competition and avoiding manipulation."*
> (Research Participant 4, 2022)

> *"…There should be control over the issuance of shipyard licenses as the number of shipyard companies is large, but job opportunities are scarce."*
> (Research Participant 5, 2022)

> *"…The defence industry is expensive. Our poll of financials is very limited. Therefore, we must stay focused and consistent on what we want from the industry. Too many players will, in the end, create unhealthy competition among the locals, but too little will establish a monopoly."*
> (Research Participant 6, 2022)

e. New Budget and Funding. The continuous lack of spending will limit research, development, testing, and evaluation (RDT & E) efforts. Nevertheless, certain companies will continue to innovate despite not securing any contracts with the government. In addition, companies will collaborate with other companies, public and private, original equipment manufacturers, and even non-defence-based companies to produce the desired product. For this reason, budget distribution planning needs to be detailed and careful so the armed forces can use high-impact products. Research Participant 7 believes the government will increase the defence budget to ensure that MAF gets the best and most reliable defence system to deal with future threats.

> *"…I am very optimistic that the government will gradually increase the defence budget to ensure that Malaysia can acquire the best defence system and equipment to safeguard the country's sovereignty."*
> (Research Participant 7, 2022)

The development of Malaysia's defence industry can be enhanced to a higher level in the future by establishing cooperative relations with defence industry countries at a higher tier. Take the example of Japan, as Tsuruoka (2020) noted, that Japan might have a collaborative relationship with European countries. Europe and Japan have excellent defence technologies that can accommodate various civilian or dual-use technologies throughout defence procurement and development. Moreover, these countries account for significant technological innovation in the global economy. At the same time, both sides recognise that managing defence equipment programs alone and without cooperation with other countries is becoming increasingly challenging. Therefore, there is a need for increased European-Japanese research cooperation for defence programmes. Similarly, Malaysia needs to move in tandem to establish cooperative relations with countries with high defence industry capabilities in the future.

Research and development (R&D) efforts in producing highly innovative military assets in Malaysia are likely to be few. The US Defence Intelligence Agency explicitly made a report regarding the overview of the overall military strength of China. Based on this report, China's People's Liberation Army (PLA) has placed significant emphasis on production output from the defence industry with the development of innovative and high-tech military sectors to meet the needs of the PLA in the future. China plans to maximise the outcome from R&D for military use. Targeted technologies include hypersonic-based equipment, nanotechnology and high-performance computing. In addition, equipment for quantum communications, system space, autonomous systems, artificial intelligence, robotics, high-performance turbofans and more efficient and robust propulsion engine design, advanced manufacturing processes (including additive manufacturing /3-D printing) and high-quality aerospace materials became China's R&D priority (The US Defense Intelligence Agency, 2019). This report makes it abundantly clear that China is very serious and highly values domestic R&D to strengthen its military capabilities.

Most countries prioritise R&D capabilities and new technologies such as green technology, artificial intelligence, robotic and unmanned systems, additive manufacturing and many more to increase product production in their respective defence industries. In addition, continued support from the government, including clear and cohesive policies, policies and frameworks, consistent allocation and appropriate stakeholder involvement, can assist in this effort.

Conclusion

There have been many efforts and specific measures put up in the past till current by the government to achieve self-reliance, including enhancing the defence industry's capacity and capability. Malaysia’s aspiration to have a sustainable and reliable defence industry to support the aspirations to defend its nation's sovereignty has faced peaks and valleys throughout the development of the industry. Among the strategies are to enhance global cooperation and collaboration for technology transfer with military asset-producer countries such as The United States, China, Italy, and Turkey. These efforts can produce military assets, and the defence industry emerges as a future catalyst for a competitive and sustainable economy. In addition, there were five significant points that policymakers in the government can consider to plan for new strategies for synergizing more opportunities and reducing risk, namely new actors, new technologies, new frameworks, new rules and new budget and funding, as per discussed above. Although, in general, there are no specific solutions or special

programs for a country to successfully achieved the desired capabilities of the defence industry in the future. As a relatively small country, Malaysia is still developing and doing its best to improve the capabilities of the country's defence industry. Throughout the beginning of the defence industrialisation in Malaysia from the 1970s till current, there were many lessons learnt and room for improvement to unleash the actual potential of the industry. Malaysia's government has demonstrated solemnity in achieving the industry's aspiration towards self-reliance. Therefore, to actualise the aspiration, all parties involved in the industry need to mobilise energy and ideas to plan a dynamic and comprehensive framework and landscape to strive for brighter and prosperous future defence industries.

In conclusion, most countries have prioritised developing and modernising their armed forces by strengthening the local defence industry. In this case, the importance of defence industrialisation is also to formulate the country's military strength to defend the nation's sovereignty from any possible security threats and simultaneously boost and improve the wealth and economy of the country. Hence, in short, the significance of the discussions and findings of this paper has argued that it is essential for the national defence industry players, especially the government, military planners, academicians, local defence companies and related agencies, to understand that learning from the past, strengthening the implementation of initiatives and planning in the present and providing more concentration and synergising to continuous efforts and willingness to move towards the achievement and survival of the superlative for the defence industry in the future.

Acknowledgement
This article is part of a research paper entitled "Sustainability Framework for the Malaysian Defence Industry Towards Achieving the Principle of Self-Reliance". My gratitude to my Supervisor and family for their continuous support and encouragement to complete this article is gratefully acknowledged.

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