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**REVIEW ARTICLE**

# Achieving Defence Self-Reliance Principle: Challenges and Strategies for Defence Industry in Malaysia

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## ABSTRACT

The development of self-reliance in Malaysia's defence industry is crucial for national security and economic growth. The ability and capability of the Malaysian Defense Industry in producing national defense assets is still weak. Therefore, this study analyzes the development of the Malaysian Defense Industry in an effort to achieve the goal of independent defense as stipulated in the National Defense Policy (NDP). This study aims to examine the technological, security, and economic factors influencing self-reliance, identify the main challenges faced by local defence industry players, and propose strategies to achieve self-reliance. This study utilizes a qualitative method involving content analysis for data collection and analysis, The study reveals that technological advancements, such as AI and cybersecurity, and economic strategies, including local content in procurement and strategic partnerships, are vital for fostering self-reliance. Key challenges identified include policy and diplomacy, data-driven strategies, and technological innovations. The study recommends increasing stakeholder engagement, enhancing academic research, and ensuring secure data management to address these challenges. By adopting these strategies, Malaysia can strengthen its defence capabilities and reduce dependency on foreign suppliers, ultimately achieving greater self-reliance.

**Contribution/Originality:** By analyzing primary sources such as government papers,

official reports, and defense policies, the study provides a deeper understanding of national military strategies, logistics frameworks, and inventory management systems.

## 1. Introduction

The defence industry plays a crucial role for nations seeking to maintain sovereignty, security, and international influence. Malaysia, as a developing Southeast Asian country, faces significant challenges in developing its defence capabilities despite efforts dating back to the 1970s (Bernama, 2021; Bernama, 2022). The Malaysian defence industry was formally established between 1970-1984, with initiatives like the 1979 PERISTA Program aimed at modernising the Armed Forces through new weaponry procurement (Balakrishnan, 2008). However, the industry has struggled due to its narrow focus on technology transfer without addressing maintenance needs, resulting in continued foreign dependence (Bitzinger, 2015).

Despite Malaysia's classification as a third-tier defence industry nation alongside Pakistan, Thailand, and Egypt, the country's security sector has progressed slowly compared to regional neighbors like Singapore, Indonesia, and Thailand (Bitzinger, 2015). Budget constraints have further hindered development, with Malaysia's military expenditure decreasing from approximately $5 billion in 2014 to $3.83 billion in 2021, representing less than 1% of GDP (Petlenko et al., 2023). This underinvestment contrasts sharply with NATO's 2% GDP benchmark and the 3% spent by regional neighbors Brunei, Myanmar, and Singapore (Firdaus, Midhio & Nakir, 2020).

A significant problem is that despite over 45 years of development efforts, Malaysia's defence sector still struggles to develop domestic defence products or generate substantial exports. The delayed introduction of a comprehensive defence industry roadmap until 2010 raises questions about government commitment to the sector's development (Chin, 2017). Additionally, local defence industry players cannot meet the Malaysian Armed Forces' requirements, forcing continued reliance on imports and foreign technology, which undermines the national goal of self-reliance and delays technology transfer processes (Abdullah & Zahari, 2023).

The National Defence Policy (NDP) 2019 represents a potential path forward, focusing on protecting national interests, sovereignty, territorial integrity, and economic prosperity through a comprehensive strategy based on self-reliance principles. However, achieving these objectives requires addressing the fundamental challenges impeding the defence industry's progress. Nonetheless, the lack of significant modernisation efforts adversely impacts Malaysia's competitiveness, making it difficult to compete in the field of strong and capable military with more developed ASEAN peers such as Singapore and Indonesia. Another problem facing the Malaysian defence industry is the weak performance of defence related companies because they do not perform well. The slow progress that Malaysia has made toward putting into practise the self-reliance concept that was emphasised in the principle of defence is one of the symptoms that can be highlighted as a reason why the national defence industry seems to impose weaknesses (Ahmad Shah, 2021).

### 1.1. Research Objectives

The primary objective of this research is to analyse the development of the defence industry in Malaysia with the guidance of the Malaysian national defence policy. To specify, this research demonstrates several objectives that can be achieved, as follows, To examine how technological and economic factors influence the development of self-reliance principles in the Malaysian defence industry, identify the main challenges faced by local defence industry players in achieving self-reliance in the Malaysian defence industry and propose policy recommendations to assist local defence industry players in achieving self-reliance within the Malaysian defence industry.

## 2. Literature Review

### 2.1. Factors that Enhance the Development of the Defence Industry

The development of Malaysia's defence industry is significantly influenced by national security concerns. The National Security Policy 2021-2025 defines security as freedom from internal and external threats to Malaysia's core values, including territorial sovereignty, socio-political stability, and international recognition. This comprehensive approach acknowledges both traditional security threats such as terrorism and territorial disputes, as well as non-traditional threats including cybersecurity and climate change, reflecting Malaysia's recognition of evolving security (Ahmad Shah, 2021).

Self-reliance principles constitute another crucial factor in Malaysia's defence industry development, focusing on reducing dependency on foreign technologies and enhancing indigenous capabilities (Mohd Nor, 2019). Malaysia's upcoming defence industry policy aims to boost self-reliance through human capital development, technology advancement, industrial growth, and global market penetration whilst leveraging foreign partnerships for technology transfer (Ahmad Nawai, 2002). Despite challenges including limited R&D capabilities, financial constraints, and technology gaps, Malaysia continues to pursue self-reliance through strategic partnerships and international collaboration (Muhammad et al., 2022). Economic development serves as a vital factor in strengthening Malaysia's defence industry, with recent initiatives like the Langkawi International Maritime and Aerospace Exhibition 2023 (Lima '23) generating RM17.6 billion in agreements, including RM10.1 billion in defence-related contracts (Mahalingam, 2023). The relationship between defence spending and economic growth remains debated, with the Keynesian perspective suggesting that defence spending can stimulate economic growth through multiplier effects, whilst the Neoclassical view warns that military expenditures may divert resources from growth-promoting sectors (Ambros, 2017). Nevertheless, Malaysia's defence ministry continues to allocate resources to develop the sector while creating job opportunities and enhancing innovation.

Technological capability represents the fourth critical factor in Malaysia's defence industry development, defined as the aptitude to effectively employ technology to achieve defence objectives (Mohamad Faisol, 2012). This includes integrating diverse technological systems to enhance operational efficiency, situational awareness, and threat response capabilities. Within ASEAN, member states are categorised based on technological proficiency, with Malaysia establishing a national framework for defence production to foster self-reliance (Vissanu, 2016). Malaysia's defence industry has

evolved from aerospace maintenance to broader domains including weaponry, information technology, and maritime sectors, though it continues to face challenges in reinforcing technological self-sufficiency.

## 2.2. Challenges in the Development of the Malaysian Defence Industry

### *2.2.1. Defence Industry Market*

The Malaysian defence industry faces significant challenges, particularly in corruption where Malaysia received a low D rating in the defence sector (FMT Reporters, 2021). Limited technological capabilities also hinder industry development, as highlighted by Bitzinger (2015) emphasized the importance of technological innovation, while Zainal-Abidin and Kadir (2014) noted Malaysia's difficulties in achieving technological advancements. Furthermore, Ahmad Fauzi (2017) argued that Malaysia's defence industry is inadequately geared towards achieving self-reliance capability.

Additional market challenges include limited opportunities due to modest military spending compared to other countries (Statista Research Department, 2022). Mat Yudin and Mohamad (2015) stressed the importance of international collaborations for enhancing competitiveness, though establishing and maintaining productive partnerships requires effective coordination and strategic planning.

### *2.2.2. Dependency on Foreign Technology*

Malaysia's defence industry heavily relies on foreign suppliers for advanced military technologies and equipment (Ahmad Fauzi, 2017). This dependency restricts the country's ability to develop indigenous defence technologies and compromises Malaysia's strategic autonomy, hindering its capacity to respond effectively to evolving security challenges (Azizan, 2013). Moreover, reliance on foreign technology often results in high costs and delays in procurement processes.

The limited transfer of technology and knowledge to the local defence industry hampers the development of local defence manufacturing capabilities (Razak, Omar, & Abd Rahman, 2020). Additionally, Kamarulzaman (2017) highlighted that reliance on foreign technology can expose Malaysia's defence infrastructure and systems to potential threats, including cyber-attacks and espionage. Addressing these challenges requires promoting technology transfer from foreign suppliers, fostering collaboration between defence industry stakeholders and research institutions, and investing in research and development initiatives (Razak, Omar, & Abd Rahman, 2020)

### *2.2.3. Geopolitical Tensions*

The ongoing tensions in the South China Sea and the broader Indo-Pacific region have necessitated a focus on immediate operational needs, sometimes overshadowing the importance of long-term human capital development essential for defence industry growth and self-reliance (Globaldata, 2023). Malaysia's delicate diplomatic position requires careful navigation of the power balance between major global players, potentially limiting its options and affecting defence industry development (Saw, 2023).

The Five Power Defence Arrangements (FPDA), which includes Australia, New Zealand, the United Kingdom, Singapore, and Malaysia, provides a cooperation platform but also

creates certain dependencies that may affect Malaysia's strategic autonomy. Additionally, non-traditional security threats such as cyber threats and terrorism pose new challenges requiring specialized skills and technologies. As these threats evolve, Malaysia must invest in human capital development to ensure its defence industry can respond effectively while supporting industry growth and self-reliance goals.

## 2.3. Conceptual Framework

### *2.3.1. Concept of Malaysian Security*

The foundation of Malaysia's defence industry development rests upon the concept of national security, encompassing traditional security, non-traditional security, and human security dimensions. Traditional security emphasizes protecting the state against external military threats, with Balakrishnan (2008) highlighting the evolution from a state-centric approach to a broader perspective incorporating societal welfare and human rights. Mohamad Faisol (2012) asserts the defence industry's vital role in preserving national security interests, territorial integrity, and sovereignty, while also contributing to economic security through technological advancements and employment opportunities. Regarding non-traditional security, Rizal and Nair (2017) underscore the necessity for collaborative actions, technological advancements, and capacity-building to tackle transnational threats including crime, terrorism, cybersecurity threats, natural disasters, and climate change. In terms of human security, Lee (2019) advocates that the defence industry should prioritize personnel welfare, uphold human rights, and adhere to ethical standards while aligning with broader goals like sustainable development and peacebuilding.

### *2.3.2. Concept of Malaysian Defence*

Malaysia's defence concept encompasses multiple critical aspects including self-reliance, modernization, collaboration, and innovation. Self-reliance denotes Malaysia's capability to independently produce and manage its defence equipment and technologies, with Mohamad Faisol (2012) underscoring its vital role in bolstering national security by reducing foreign dependence and enhancing sovereignty. Modernization involves upgrading defence capabilities to address evolving security challenges, with Ahmad Fauzi (2017) emphasizing its holistic nature encompassing both conventional and non-conventional threats while requiring investments in human capital, infrastructure, and cutting-edge technology. Collaboration refers to partnerships with other countries or organizations, with Balakrishnan (2008) examining regional and international cooperation in Malaysia's defence policy, highlighting benefits including mutual trust promotion, best practices exchange, and advanced technologies access. Innovation involves creating and adopting novel products, processes, or services, with (Hussain & Ismail, 2019) identifying key drivers such as customer demand, competition, and government support, alongside barriers including funding limitations and skills shortages.

### *2.3.3. Concept of Revolution in Military Affairs (RMA)*

The Revolution in Military Affairs (RMA) serves as a crucial conceptual framework for Malaysia's defence industry development, referring to transformative changes in military capabilities, doctrines, and strategies resulting from technological, organizational, and operational advancements. Balakrishnan (2008) highlights RMA's

significance in shaping warfare's future, enabling new operational approaches, and enhancing military effectiveness. The defence industry plays a vital role in adapting to and driving RMA through developing advanced technologies like artificial intelligence, cyber capabilities, and unmanned systems, with Bitzinger (2015) emphasizing its importance in providing cutting-edge solutions for evolving military requirements. Research and development is critical to RMA, which is important in developing new technologies and improving military effectiveness. Balakrishnan (2008) further emphasizes the significance of collaboration between the defence industry and academia in supporting RMA efforts through partnerships, knowledge sharing, and joint projects to develop and apply advanced technologies.

## 3. Research Methods

This study analyzes the technological, security, and economic factors influencing self-reliance and challenges in developing Malaysia's Defense Industry in the effort to achieve the goal of modernizing the armed forces to effectively take on the responsibility of safeguarding national security and sovereignty. Content analysis was chosen due to its suitability for examining official documents and policy-related materials. This study employs qualitative research methods, emphasizing data collection through document analysis and library research. Secondary data consists of information gathered from both printed and non-printed sources, irrespective of their publication status. These sources may include books, journals, newspaper articles, written reports, periodicals, and ministry-produced bulletins. This includes analyzing documents such as national defense reports and other relevant resources. The findings are expected to provide guidance and support to stakeholders in the development of Malaysia's Defense Industry. Additionally, information sources, including internet connectivity and electronic data, were incorporated into the study.

## 4. Results

### 4.1. Technological, Security and Economic Factors Influencing Malaysia's Defence Industry Development

#### *4.1.1. Technological Factors*

Malaysia's defence industry development faces complex challenges in modernising legacy systems while developing indigenous capabilities (Sulaiman et al., 2020). Prior to independence in 1957, Malaysia's military industry was limited to repair and overhaul operations, with substantial policy revisions occurring in the 1960s and 1970s when an import strategy was implemented to stabilise commercial relationships. Key industry stakeholders revealed critical technological challenges. "Malaysia's weapon radar systems have been a crucial part of the nation's defense infrastructure for an impressive 37 years. However, their prolonged use underscores the urgent need for modernization to address growing challenges. The traditional 'Business As Usual' (BAU) approach to maintenance, which has been relied upon for managing these systems, is no longer adequate. The rapid pace of technological advancements and the increasing complexity of modern warfare demand a shift in strategy to ensure these systems remain effective and reliable.

The growing importance of indigenous technology development in strengthening national defense capabilities (Tambunan et al., 2022). Project 275 Perisai serves as a

notable example of advancements in integrating local technologies. This initiative underscores the potential of domestic innovation, as evidenced by forthcoming validation trials designed to assess products developed through collaborations with local universities. Such efforts represent a pivotal transition towards fostering self-reliance and enhancing indigenous technological competencies within the defense sector. The strategic importance of localised research and development in the defense sector, stating that the establishment of 20 defense technology centers in Kepong represents a deliberate effort to strengthen indigenous capabilities. This initiative is foundational in fostering sustainable national defense capabilities through systematic knowledge transfer and the development of local expertise. significant advancements in indigenous technology development since 2000. Early efforts involved just four researchers utilizing technology sourced from local universities, particularly University Putra Malaysia (UPM), through student thesis research. These endeavors have since led to exponential growth in domestic technological capabilities, particularly in practical applications within surveillance and maritime security systems.

Under the 2024 national budget, which allocated RM47.7 billion to the defense sector, substantial investments were made in strategic assets. Key acquisitions include Maritime Patrol Aircraft, Unmanned Aerial Systems, and 136 units of High Mobility Armoured Vehicles for the army. Additional assets include Fast Interceptor Craft, Beacon and Anti-sonar Decoy systems for submarines, and three Littoral Mission Ships for naval operations (Sharil Badri, 2024). This budget underscores the government's commitment to enhancing national security infrastructure and modernizing military capabilities.

*4.1.2. Security Factors*

The evolving cybersecurity landscape has witnessed significant advancements in recent years. Substantial progress, the transformative impact of quantum-resistant protocols, and AI-driven threat detection. These innovations have notably enhanced cyber defense capabilities, achieving a 175% improvement compared to 2019 benchmarks (Achuthan et al., 2024). The integration of advanced neural networks for predictive analysis has played a pivotal role in revolutionizing threat identification and response strategies, marking a paradigm shift in cybersecurity frameworks.

Similarly, maritime domain awareness has emerged as an essential element in regional security. The importance of advancements in surveillance technologies. The deployment of sophisticated drone swarms for maritime patrol has redefined surveillance operations, enhanced the protection of critical offshore installations, and improved situational awareness in maritime security contexts. Cybersecurity and maritime surveillance have demonstrated profound technological growth and integration, signaling a promising future for enhancing regional and global security measures. These advancements underscore the critical need for sustained innovation and strategic investment in emerging technologies to address evolving security challenges.

*4.1.3. Economic Factors*

The Malaysian defense sector is undergoing a significant transformation, evolving from small-scale operations into major industry players. This transition highlights the growing importance of incorporating local content into defense procurement processes. With its extensive involvement across multiple domains, including aerospace, maritime, weaponry, automotive, and dual-use military commodities, the defense industry

possesses substantial potential to contribute meaningfully to Malaysia's economic development. Economic opportunities within the defense supply chain play a crucial role in the sector's growth and success. the effective management of these opportunities, alongside addressing key challenges such as project execution, stakeholder engagement, and maintenance processes, can unlock substantial economic benefits while simultaneously enhancing Malaysia's defense.

Strategic partnerships have been identified as another cornerstone of growth within the defense industry. Collaboration with both local and international partners enables resource sharing, expertise exchange, and innovation, fostering technological advancement. These partnerships not only strengthen Malaysia's defense technologies but also contribute to broader economic opportunities, including job creation, thereby supporting the holistic development of the defense sector. The Malaysian defense industry's progression towards becoming a substantial economic contributor reflects the need for sustainable strategies in procurement, partnerships, and innovation. By capitalizing on local content development and fostering strategic collaborations, the sector can continue to thrive as a key driver of both national security and economic growth.

### 4.2. Key Challenges Faced by Local Defence Industry Players in Achieving Defence Self-Reliance

#### *4.2.1. Policy and Diplomacy*

The vital role of policy and diplomacy in achieving self-reliance in defence industry. Key strategies include fostering international collaborations and facilitating knowledge exchange to strengthen capabilities and ensure sustainable progress. The Malaysian defense sector operates within a volatility, uncertainty, complexity, and ambiguity (VUCA) environment, presenting unique and multifaceted challenges. The complexity of this environment is compounded by the reliance on an aging fleet that requires substantial financial resources to maintain operational readiness, further highlighting the sector's vulnerabilities. The advancement of Malaysia's defense capabilities is contingent upon a strategic focus on diplomacy, international partnerships, and knowledge sharing. Addressing the challenges posed by a VUCA environment and modernizing aging defense assets will be crucial to ensuring long-term resilience and self-reliance in the sector. Sustained investment and innovation in both human and material resources will be imperative to achieving these goals.

#### *4.2.2. Data-Driven Strategies*

The pivotal role of data-driven strategies and analytics in reinforcing the principle of self-reliance within the development of Malaysia's defense industry. These approaches offer valuable insights and frameworks that contribute to enhancing efficiency and strategic decision-making in the sector. Meanwhile, findings reveal that approximately 75 percent of the 44 naval vessels owned by the Royal Malaysian Navy (TLDM) have surpassed 40 years of service, with some exceeding 50 years. This aging fleet highlights critical challenges in ensuring operational readiness and underscores the urgency of modernization efforts within Malaysia's maritime defense infrastructure. The integration of advanced data-driven methodologies and analytics offers a path forward for addressing the complex challenges in Malaysia's defense sector. Coupled with strategic investment in fleet modernization, these innovations have the potential to

strengthen national self-reliance and ensure long-term resilience in safeguarding the country's defense capabilities (Hamzah & Ramli,2018).

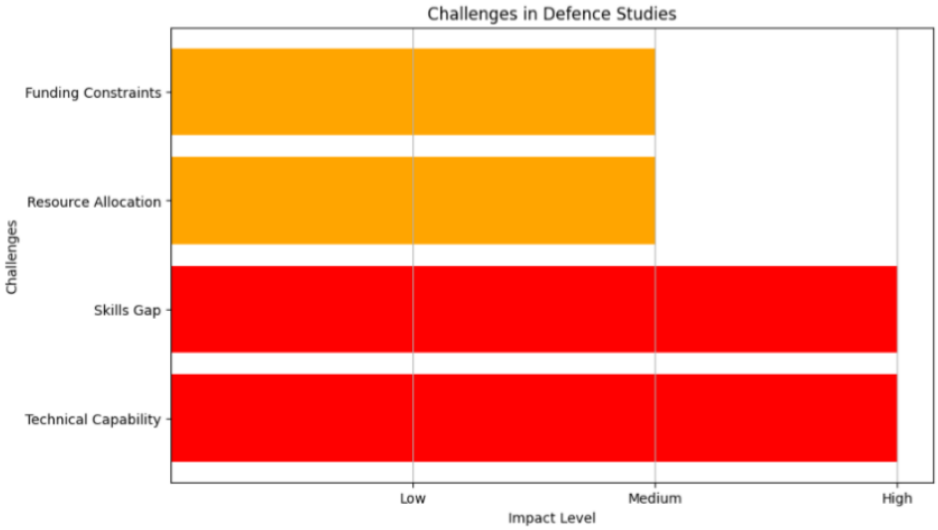
*4.2.3. Technological Innovations*

The significance of technological innovation in achieving self-reliance within the defense sector. Advancements in maritime surveillance are identified as critical components in strengthening Malaysia's defense. Maritime security challenges remain a pressing concern for Malaysia, particularly in its Exclusive Economic Zone within the South China Sea. These challenges underscore the need for enhanced surveillance and defense strategies tailored to the region's geopolitical complexities. Technological innovation stands as a cornerstone for achieving self-reliance in the defense sector, particularly for nations like Malaysia facing complex maritime security challenges (Azizan, 2013).

### 4.3. Analysis of Challenges in Malaysia's Defence Industry

As depicted in Figure 1, the figure was adapted from Moses (2005), *Impact Probability Matrix*. The matrix highlights four key challenges: Technical Capability, Skills Gap, Resource Allocation, and Funding Constraints. An Impact-Probability Matrix was employed to visualise and prioritise challenges in Malaysia's defence industry. This matrix shows that Technical Capability and Skills Gap are the highest priority challenges in Malaysia's defence industry, requiring immediate attention. Technical capability and skills gap emerged as high-priority concerns requiring immediate attention. Resource allocation and funding constraints were categorized as medium-priority challenges but remain significant barriers to technological development and operational effectiveness (Naderpour et al., 2019).

Figure 1: Impact Probability Matrix for the Challenges in Defence Industry in Malaysia




Source: Moses (2005)

### 4.4. Policy Recommendations

To strengthen Malaysia's defence industry and achieve enhanced self-reliance capabilities, a syndication process was conducted to validate strategic recommendations from key industry informants. This is to ensure alignment with the National Defence

Vision while addressing the technological, economic, and security challenges facing local defence players. The following strategies are recommended:

*4.4.1. To establish a comprehensive policy framework that aligns defence industry development with national security objectives*

The implementation of the National Defence and Security Industry Policy should be prioritized to provide definitive guidance for local defense industry stakeholders. Accelerating this process would establish regulatory certainty, encourage investment, and ensure systematic development aligned with Malaysia's strategic defense priorities. The importance of such policies is developing a comprehensive defence policy that aligns with national security objectives is essential (Mohd Fajil et al., 2022).

Furthermore, this approach directly supports the primary vision of the Defence Policy Framework (KPP) 2020-2030, which aims to position Malaysia as a safe, sovereign, and prosperous nation through the implementation of the three pillars outlined in the National Defense Strategy. By harmonizing policy development with strategic defense goals, Malaysia can cultivate a robust defense industry while reinforcing its long-term national security objectives.

*4.4.2. To strengthen public-private partnerships that foster innovation and enhance domestic technological capabilities*

The Ministry of Defence should prioritize the establishment of formalized frameworks to facilitate collaboration among government entities, private industry stakeholders, research institutions, and universities. Such frameworks would foster the creation of innovation ecosystems, optimizing the utilization of complementary strengths, resource-sharing, and accelerating the development of indigenous defense technologies. The importance of this initiative is emphasized the necessity of developing robust public-private partnerships to enhance innovation and efficiency within the defense sector. Recent policy discussions have further suggested the inclusion of diverse stakeholders, such as entrepreneurs and academic institutions, to enrich collaborative efforts and drive impactful outcomes. Coordination of these efforts can be achieved through existing mechanisms, including Majlis Penguat-kuasaan Keselamatan Malaysia (MIDES) and Institut Penyelidikan Sains dan Teknologi Pertahanan (STRIDE). By integrating these entities into a cohesive framework, Malaysia can strengthen its defense capabilities and advance towards sustainable and innovative development.

*4.4.3. To expand international collaborations and knowledge exchange programmes*

The Ministry of Defence should prioritize the establishment of strategic bilateral agreements aimed at fostering defense industry cooperation, facilitating technology transfer arrangements, and promoting joint research initiatives. These measures are essential for providing Malaysian defense companies with access to advanced technologies, international best practices, and global market opportunities, while simultaneously strengthening domestic capabilities. The importance of international collaborations and knowledge exchange in granting access to cutting-edge technologies and best practices. Existing initiatives, such as the "Tanjung Perdana" ship project and the Royal Malaysian Air Force's (TUDM) aircraft maintenance programs, exemplify the potential benefits of such collaborations. However, these efforts must be systematically expanded to ensure meaningful knowledge transfer, thereby enhancing local capabilities

without fostering dependency relationships. By prioritizing and strategically managing these collaborations, the Ministry of Defence can drive innovation, bolster self-reliance, and contribute to the long-term development and sustainability of Malaysia's defense industry

## 5. Conclusion

In conclusion, this study examined the development of self-reliance principles in the Malaysian defence industry, identifying challenges faced by local players and proposing effective strategies. The study revealed that technological advancement, security enhancement, and economic development are critical and interrelated factors influencing defence industry self-reliance. The findings highlighted several significant challenges including policy inconsistencies, limited data-driven decision-making capabilities, technological gaps, and resource constraints, with the Technical Capability and Skills Gap emerging as high-priority concerns requiring immediate attention. In response, the study recommends establishing a comprehensive policy framework aligning with national security objectives, strengthening public-private partnerships to foster innovation, and expanding international collaborations for knowledge exchange. The Impact-Probability Matrix employed in this research provides a structured approach to prioritising these challenges, while informant insights from various defence industry segments offer valuable practical perspectives. By implementing these recommendations, Malaysia can enhance its indigenous defence capabilities, reduce foreign dependency, and achieve greater self-reliance while contributing to national economic development and security resilience.

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## Conflict of Interest

The authors declare that they have no conflicts of interest related to the research, authorship, or publication of this study.

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