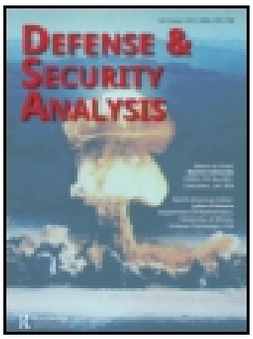

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How to measure value from defence spending? The Malaysian case study

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ABSTRACT

Nations and their citizens now demand clear evidence as to the benefits of defence spending. The opportunity cost of defence expenditure against other sectors is constantly queried. It is economically challenging to find consensus amongst traditional economists, and policy-makers, on how to measure value in the context of defence. This article offers solutions by using the case study of Malaysia. Primary data sources include open-ended and semi structured interviews to produce a thematic discussion, as well as secondary resources. The author argues that it is hard to appraise defence value, as measurements are case-specific. Rather, the paper will use a novel 'Triple-Defence Value Framework', to argue that value can be measured by dividing the role of defence into a primary level: for protection and safety; a secondary level: for socio-economic prosperity; and a tertiary level: for soft power projection. The paper concludes by using the framework to measure the value derived from the Malaysian defence sector.

KEYWORDS

Defence value; defence spending; defence economics

Setting the scene

Is Adam Smith's statement that "defence is more important than opulence" still relevant today?[1] There is continuous debate justifying defence spending, which is often seen as unnecessary and providing poor return on opportunity costs compared to other sectors. In the UK, for example, taxpayers continue to question the government's highly controversial decision to maintain; let alone replace, the Trident nuclear submarine fleet. Nonetheless, we have witnessed an ongoing and significant rise in global defence spending since the Second World War. In 2018, global defence spending totalled approximately USD $1.8 trillion.[2] Globally, the USA remains the largest defence spender at USD $648.8 billion (3.2% of GDP)[3] followed by China at USD $250 billion (1.9% of GDP).[4] Figure 1 shows the world's top defence spenders in 2018.[5] Traditional economists argue that defence is one of few areas requiring "the expense of sovereign and commonwealth," justifying state intervention in the economy. Hitch and McKean (1960) in their seminal piece *The Economics of Defense in the Nuclear Age* also highlighted the deliberate choice that has to be made between a nation changing its national

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budget and reshaping its armed forces as long as that change appears to gain more than its costs.[6]

The attractiveness of an assessment of the value derived from defence expenditure is self-explanatory, but difficult to define. There is constant debate over the nuances encompassing value, and the importance of measuring the input, output, and impact derived. Some have also questioned the difference between value-creation and value-extraction.[7] The topic of value becomes even more complex when seen in the context of defence expenditure. An oft-mentioned term in defence is the concept of "value for money" (VFM), used to justify defence procurement activity, and relies on evidence-based claims utilising in-depth evaluation and current research findings.

Most studies have addressed this topic from an economic perspective, discussing the subject from a principal-agent model; or cost–benefit analysis, often struggling to integrate the hard evidence of value derived from defence expenditures. Practitioners in the field have attempted to address this topic from a more pragmatic angle, but nonetheless apply several economic principles to explain the concept of value and the rationale behind measuring value from defence expenditure. Therefore, the author has applied the proposed theoretical framework to the real-world example of Malaysia. This choice was due to the author's familiarity with the Malaysian defence context, and subsequently greater ease in obtaining data, which can be extremely difficult in the defence sector.

The framework has considered input from various sources including academic papers, government reports and news articles, supported by interviews with experts in the field, policy-makers, commercial stakeholders, and military personnel. The author was indirectly involved in providing input and guidance to senior stakeholders when the government developed its 2020 Defence White Paper (DWP).[8] This article is divided into three sections. The first section critically analyses the meaning of value, theories that

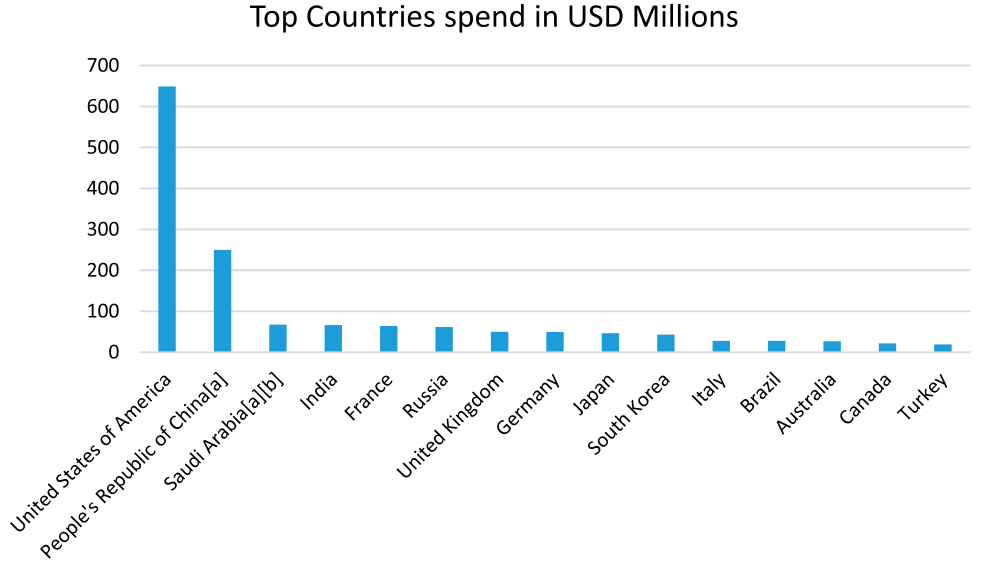

Figure 1. Top countries by total spend in Million USD. Source: Stockholm International Peace Research Institute (SIPRI), *Yearbook 2018*: Stockholm, Sweden 2018.

relate to value, the concept and complexity of measuring value in the defence context, and proposes a theoretical framework on measuring value. The second section briefly outlines Malaysia's DWP and evaluates why measuring value is important for the Malaysian defence sector. The third section evaluates how the Malaysian defence sector is delivering value to taxpayers. This section also critically discusses the challenges faced by Malaysia in delivering value and raises some intriguing questions on how Malaysia can more effectively boost defence value through defence spending.

Measuring value in the defence sector

What is value?

The concept of value has received little attention in the field of economics. The theory of value originated in the seventeenth century when Francis Quesnay, a French economist, formulated the first systematic theory of value displaying how value was being created and circulated in the economy. Eighteenth-century economics associated value to land and agricultural productivity and farmers as creating value. The eighteenth and nineteenth-century classical economists including Adam Smith, David Ricardo and Karl Marx, measured value by labour invested in an activity, and the successful adoption of new technologies.[9] However, twentieth-century neo-classical economists defined value as a function of demand and supply and saw value as utility, or perceived property.

What is value? How and from whose perspective is value being measured, and against what? Value can be direct, numerically measured (quantifiable), or indirect, such as intrinsic value. Value can be labelled as shared value, VFM, or added-value, and even sometimes measured by one's conduct and behaviour. The theory of value examines the subject from several perspectives including ethics, politics, economics, and philosophy. From a utilitarian perspective, the greatest value lies in that which provides the greatest utility to the greatest number; whilst in a business context, value for a shareholder can reside in profit maximisation, as opposed to other stakeholders who may find greater value in innovation. Overarchingly, it is often argued that any definition of value and how it is measured is prescriptive.

At the core of economic thinking, value is defined as price set by supply and demand. Hence, when an activity results in a payment, this is seen as value. Value can also be seen as an intermediary process or "flow," such as adding value to a manufacturing supply chain or creating new knowledge bases.[10] Then there are further riddles as to how these outputs are produced, how they are shared across society, whether production is useful and what is done with subsequent earnings.

Value derived by governments

The public sector is often castigated by some commentators as being "unproductive" in delivering value, as government expenditure is funded by taxing the productive parts of the economy. However, these critics do not fully recognise public sector contributions in value-delivery. The simplistic view posits government as an acute example of an unproductive sector. Others argue that government expenditure in delivering value should be seen as a process, or intermediary, that creates the conditions for a peaceful state,

connected through infrastructure, police, national defence, and the rule of law that allows for production and services, all of which contributes to a nation's prosperity. Intrinsic value generated through government intervention cannot be analysed in the same way as other sectors of the economy. Even traditional economists have recognised the important role of government in providing sufficient investment into sectors such as the military, judiciary, and other essential public services, as they provide the basic institutional and physical infrastructure necessary for economic growth. The public sector then pursues identified goals, manages the inputs, and convinces taxpayers of the value delivered through spending.[11]

Valuing the impact of defence and armed forces

Valuing the impact of defence is complex, often sparking a debate over the benefits and tangible outcomes derived from defence to a nation. Defence is often considered as an opportunity cost dilemma, with some suggesting it has limited direct economic benefits. Therefore, the challenge is in demonstrating the value of defence and effectively communicating this to civil society. This value may be intangible – how do you measure risk and protection? How can you convincingly prove a negative: that defence spending results in threat deterrence? Can we argue that defence is essential in delivering the requisite protection and safety to conduct business and create order? In defence, measuring direct and indirect value is tedious and often becomes subjective. What is being measured? Is it the costs and benefits, inputs and outputs, outcomes or impacts? Defence has to articulate how activities improve the quality of life for every citizen, or it will fail adequately to justify defence expenditure, or prove the existence of viable returns to taxpayers.[12] A common dilemma arises when considering the optimal size of national armed forces and defence budget allocations as a proportion of GDP. Figure 2 shows the proportion of defence budget against GDP for the top 20 countries with the highest defence spending in 2019. For example, military spending in the Kingdom of Saudi Arabia (KSA) represents 8.8% of its GDP, one of the highest in the world.[13] Despite the fact the KSA remains embroiled in an ongoing war in Yemen, is this spending rational relative to the KSA's overall national income? Disproportionate defence spending at the expense of other sectors can diminish overall value. In order to be treated as critical, the defence sector and the armed forces must invest in the value-creation process in order to demonstrate that their services are essential in both war and peacetime.

Several defence economists have questioned the efficiency of national defence represented by the armed forces and domestic defence, and whether they provide value for money.[14] Defence inputs were identified as personnel, equipment, and supporting infrastructure, as part of a defence spending policy. Defence output includes measures such as the protection of citizens and their assets, businesses, economic infrastructure, national institutions, and natural resources, but also as deterrence, war-fighting capability, disaster and humanitarian relief, as well as economic contributions to employment and possibly even exports. By contributing to international peace and stability, defence enables globalised trade, exchange, and foreign direct investment, thus contributing to national prosperity through endeavours such as the safeguarding of shipping against piracy. Prosperity impacts from defence spending include innovation and spin-offs,

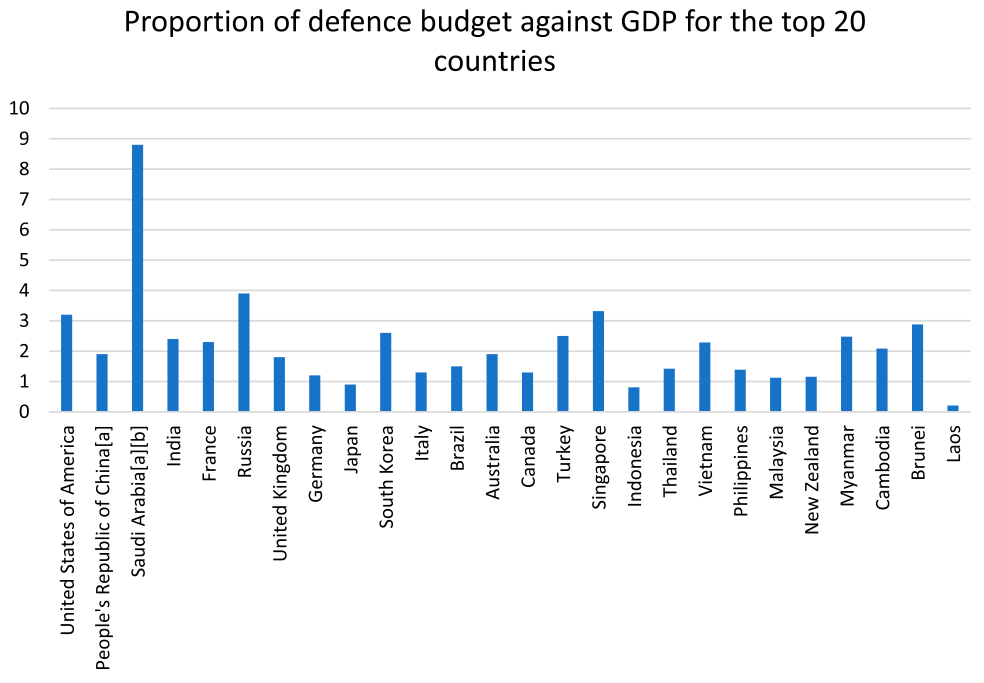

Figure 2. Proportion of defence budget against GDP for the top 20 countries. Source: Stockholm International Peace Research Institute (SIPRI), *Year Book 2019*: (Stockholm, Sweden 2019).

human capital investments, local economic impact, and long-term influences on local labour markets.

There are several government reports that have tried to incorporate value into how defence policies can impact society. The 2017 UK Defence Industrial Policy (DIP) referred to defence delivering: "wider economic, international value and national security objectives."[15] The report highlights how defence procurement strengthens productivity (especially at the local level), boosts exports and contributes to national prosperity on a sustainable basis.[16] The Philippe Dunne report (2018) titled: "Growing the Contribution of Defence to UK Prosperity" was the outcome of an enquiry by the National Audit Office (NAO) on the outcome and impact of defence spending to British citizens. The report attempted to validate the national contribution of defence and the armed forces, and measured the contribution of defence to economic growth, national life, people, ideas and innovation, and location – five core factors used to justify UK defence spending.[17]

Again, the 2019 UK Ministry of Defence document titled "Mobilising, Modernising, and Transforming Defence" identified three key themes. It scrutinised defence value through broad national security objectives: to protect our people; to project our global influence; and to promote our prosperity (3P).[18] This concept of value was also discussed at a January 2020 workshop titled "Prosperity and Value: What is Defence's Triple Bottom Line?" organised by the International Institute for Strategic Studies (IISS) in conjunction with the Development, Concepts and Doctrine Centre (DCDC) at the Defence Academy of the United Kingdom.[19] The workshop represented various stakeholders, yet managed only to scratch the surface in terms of consensus on

a definitive qualitative measure for the outcome and impact of defence spending as tied to UK prosperity.[20]

Technological innovation and spin-offs to the civil sector have always been cited as a major contribution from defence spending. Many major innovations from the past were spin-offs through investment in defence R&D. The internet was originally developed for secure military communication. ATM machines, from which most of us receive cash, rely on the Global Positioning System (GPS) for theft protection – originally developed for US military Navigation. Flat screen televisions, radar, laptops, tablet computers, and touch-screen mobile phones use liquid crystal displays, another invention made possible by past military R&D. A more recent example of technology crossing over from military to civil use are autonomous cars, the voice assistant SIRI, and thermal imaging. The defence sector has also significantly invested in education and training. If effectively utilised, this investment into human capital should be translated into knowledge and capabilities that increase a country's productive capacity and aid overall potential growth.

The Triple-Defence Value (TDV) framework to measure value

In the context of this paper, the TDV framework as seen in Figure 3 is used to measure value derived from defence spending. TDV is a suggested policy framework that could be applied by policy-makers and practitioners to measure the value outcome from defence spending. The framework was developed using a variety of sources ranging from secondary literature and government reports to interviews with stakeholders and workshops attended by the author. The data gathered to measure value in this context were mostly qualitative, as it can be difficult to obtain quantitative data in a defence context. The model is mainly aimed at measuring the outcomes of defence spending, though it can be argued that specific processes in defence can also be counted as producing value. For example, the act of defence diplomacy is a process that is highly valuable as it requires complex negotiation and networking to thwart war. Unfortunately, such processes do not get captured when measuring value in defence. In the context of this paper, we measure the outcome from defence activities as opposed to the processes in defence. The primary role of the armed forces and the Ministry of Defence is to protect citizens at home and abroad; protect critical infrastructure; prevent conflict; secure national borders and oversea territories; and ultimately deliver peace. In order to achieve these roles, the armed forces require the ability to access and anticipate future security threats including direct military action, terrorism or cyber-threats; and the subsequent ability to plan around specific capabilities required to face identified threats. These capabilities would include equipment, training, information, concepts and doctrine, personnel, infrastructure, organisation, and logistics. The defence budget is then used either to procure the required capability, fund indigenous production through the allocated R&D budget, or to enter into collaborative partnerships. In the context of the TDV framework, the primary value could be derived as the level of readiness of units, their war-fighting capability, and their subsequent deterrent effect. However, empirical measurement of these primary value indicators poses a significant challenge as data is either not available or confidential.

The secondary level of value in this framework is the national economic benefit from defence spending and benefits to society. The economic benefit of defence spending is

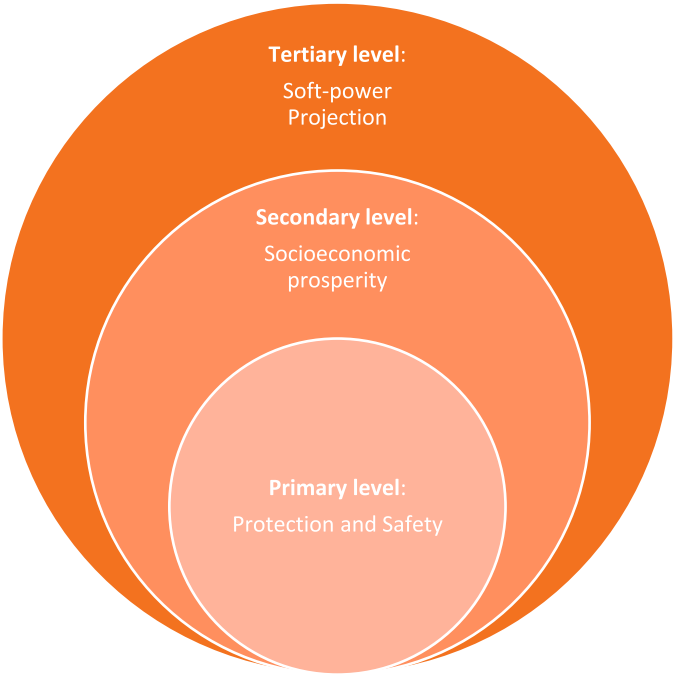

Figure 3. Triple-Defence Value Framework (TDV). Source: Author.

derived from factors such as the contribution to technological innovations, exports, employment, intellectual property rights (IPRs), foreign direct investments, industrial partnerships and offsets, regional development through building regional clusters and technology parks, and a number of small and medium size industries (SMEs) supported through defence activities. Societal benefit is measured, first, by costs to society if attacked by enemies, due to loss of infrastructure, jobs, ability to conduct business, and an overall reduction in GDP. In economic terms this is also known as protection adjusted life years (PALYS). Second, the volume and extent of participation of the armed forces in peace-keeping missions, engagement in disaster relief, border control, sea patrol, rescue missions, humanitarian aid, as well as conducting crisis management such as during a pandemic, or incidents caused by climate change. The defence sector's other ancillary societal value also includes its ceremonial roles, supporting veterans and their families, contributing to armed forces pensions, and adding value through civil–military integration during crisis and reconstruction phases.

The tertiary level of value is defined as soft power projection. Value in this context is defined as capacity-building measured through training and education programmes (including their quality and relevance); the numbers of trained military personal; and promotion of universities, strategy-oriented think-tanks and other defence-related institutions, both domestically and internationally, that can help establish credibility. Soft power is also used to promote the "rules-based international order," and may be measured through numbers of bilateral and multilateral defence co-operation agreements and alliances; joint-military exercises; participation at defence exhibitions; air-shows; and international defence conferences or fora.

Measuring defence value: the case of Malaysia

The Defence White Paper (DWP)

The Malaysian government published its first Defence White Paper (DWP) in January 2020.[21] The Malaysian Ministry of Defence (MINDEF) highlighted three very ambitious reasons for drafting the DWP.[22] First, to foster a transparent leadership process through change in how the government delivers value to the public.[23] Second, to inform the Malaysian public on the role of the armed forces, but also to promote Pertahanan Menyeluruh (HANRUH)[24] – or total defence,[25] a concept introduced to express the collective responsibility of government and civil society in managing security and handling crises. The third and most relevant reason is specifically to inform the Malaysian public on the value derived from defence spending.

The DWP was drafted based on consultation and dialogue[26] amongst various governmental agencies, extensive meetings with defence and security circles, overseas governments[27], and members of the public.[28] Formulation was spearheaded by the Malaysian Institute for Defence and Security (MIDAS), together with the Strategic and Policy Planning Division of MINDEF, a technical team from the Armed Forces, academics, and the defence industry sector. The final version of the DWP was tabled on 2nd of December 2019.[29] The DWP explains the ministry's vision, strategy and implementation of defence policy, and has a timeline of 10 years (2020–2030).[30] The policy document is aligned to the National Security Policy (NSP)[31], National Foreign Policy (NFP)[32] and the National Defence Policy (NDP).[33] Nonetheless, the DWP has faced criticism in that the content is not significantly different from the 2010 Defence Policy Paper.[34] Others argue that the DWP has "loopholes" and that it has failed to address the real challenges facing Malaysia, and some say that the paper has failed to demonstrate empirically value derived from Malaysia's defence spending.[35] However, there seems to be strong support from stakeholders in adhering to the DWP and proposed plans.

How does the Malaysian government define value? Is this different from general value terminology? There is no hard evidence regarding its usage of the concept of "value," except the term "value for money" in procurement policies. The Ministry of Finance's treasury circular refers to the Outcome Based Budget (OBB) introduced since the 10th Malaysia Plan (2010 till 2016), used to measure outcomes from government spending. Each Malaysia Plan is a five-year comprehensive economic development blueprint prepared by the Economic Planning Unit within the Prime Minister's Department.[36] Unfortunately, the results are yet to be available in the public domain. Hence, the value derived from Malaysia's defence spending based on the DWP in this paper is measured using the TDV model.

Defence context

It is contentious whether defence spending has added-value and contributes to Malaysia's prosperity. It is often argued that Malaysia's internal security counters more immediate threats, and hence is more critical than defence. However, defence is still seen as an integral component of Malaysia's comprehensive security environment. The 2010 Malaysian defence policy specified that the primary role of defence is to protect and defend the

nation's strategic interest, with sovereignty, territorial integrity and economic wellbeing as core factors.[37] Malaysia is a parliamentary democracy with a multi-ethnic population of around 32 million, located strategically within sea lanes between the South China Sea, Sulu Sea, the Andaman Sea and the Straits of Malacca, through which 30% of global seaborne trade passes.[38] As a small littoral state with limited defence capability, Malaysia projects a defensive posture whilst actively promoting defence diplomacy as the first line of defence through bilateral and multilateral negotiations at ASEAN, regional, and global levels.[39] However, the DWP recognises there are imminent, immediate, and future threats facing the country, and that a substantive level of deterrence capability is essential. Hence, a credible defence force is crucial to protect East and West Malaysia's land, sea, and air borders.

Defence strategy

According to the DWP, the Malaysian defence strategy is grounded on three pillars: concentric defence, comprehensive defence, and credible partnership.[40] The first pillar refers to the concept of concentric deterrence that divides strategic interests into base, extended, and front-line areas.[41] The second pillar refers to the role of the "whole of government" and "whole of society," and emphasises the importance of internal cohesion in building defence resilience. The third pillar refers to building, strengthening and widening collaboration and external relations through bilateral and multilateral platforms. However, the document is vague on strategic priorities, how these strategies will be operationalised, or the targeted resources required for this purpose.

Defence spending and budget allocation

The question remains whether Malaysia has targeted sufficient and effective investment towards its defence budget. Figure 4 illustrates Malaysia's defence spending over the past 10 years with a total figure of USD $3,827 billion (1% of GDP) in 2019. Average defence spending (highest in 2003 at around 2.3% of GDP) has been constantly declining to around 1–1.5% of GDP since 2014.[42] This figure is still higher than many other ASEAN countries, but lower than Singapore and Indonesia. This downward spiral is mainly attributed to overall government budgetary constraints and the country's economic turmoil, but will now be further exacerbated by the financial impact of COVID-19. This negative trend has certainly been a concern considering the Malaysian Armed Forces' (MAF) lagging defence capabilities and the country's inability to address some of the critical security challenges both facing Malaysia and looming in the region.[43]

Figure 5 illustrates the bulk of Malaysia's defence budget, of which 77.5% is allocated to operating expenditure (OE).[44] The development expenditure (DE) of 22.5% is allocated to the procurement of equipment and services, infrastructure development, R&D, and other procurement-related costs.[45] In the DWP, there is mention of long-term funding streams and efforts to reduce the existing funding gap in the MAF. However, the budget lacks clarity on projected future allocation, priority of expenditure as per services and sectors, and sources of funding. The white paper would have been more effective had it shown greater clarity in identifying top priorities. Further, as defence management is currently under the purview of the federal government, there

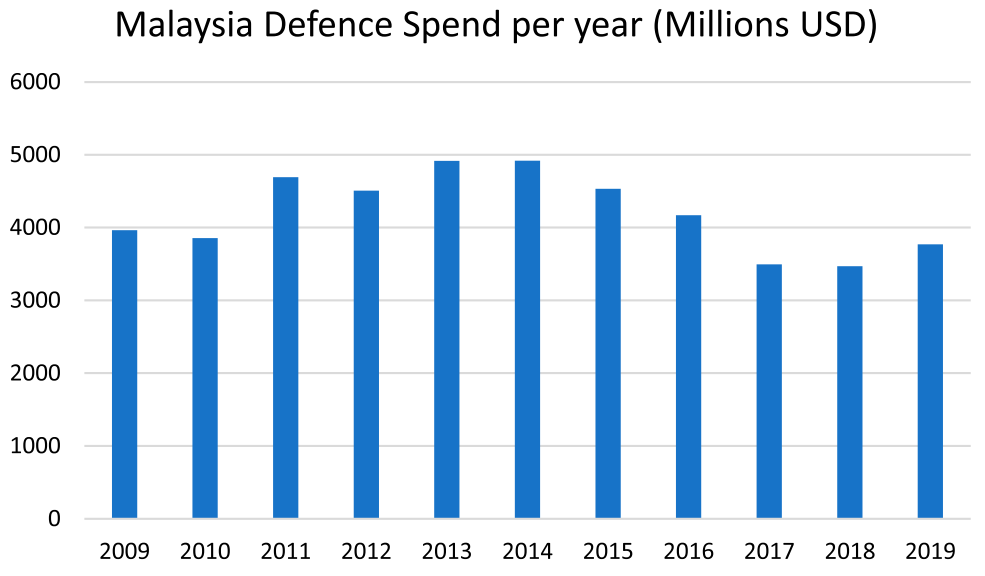

Figure 4. Malaysia's defence spending (2009–2019) in USD. Source: *Source:* Stockholm International Peace Research Institute (SIPRI), *Yearbook 2020*: Stockholm, Sweden 2020.

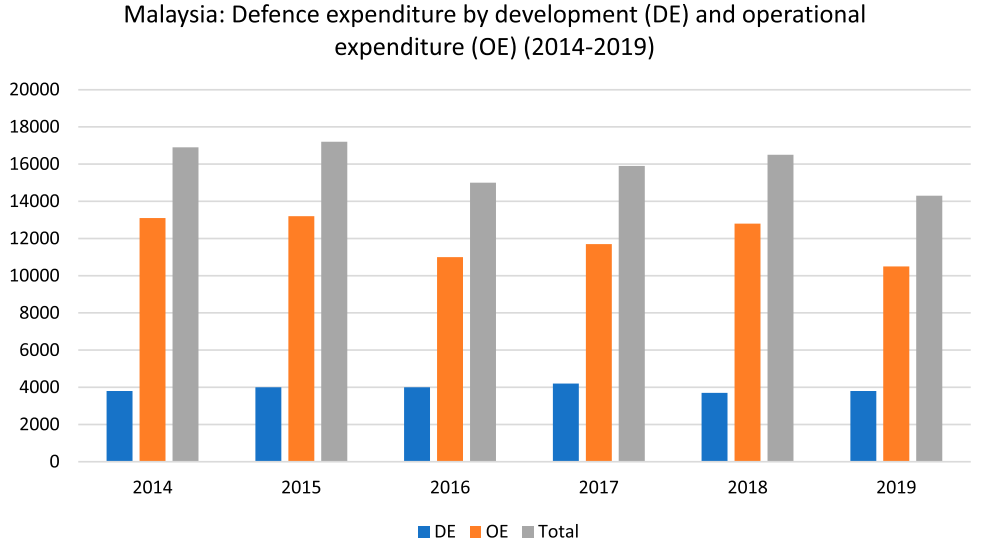

Figure 5. Malaysia: Defence expenditure by development (DE) and operational expenditure (OE) (2014–2019). Source: Ministry of Finance, Malaysia, sourced online: https://www1.treasury.gov.my/index.php/fiskal-ekonomi/data-ekonomi.html, 2020, May 4.

must be greater co-operation between the federal and state levels in order to realise the concept of "whole of government." Nonetheless, each state has devolved powers to run administrative functions and manage revenue and budgets. Going forward, the lack of transparency on levels of future defence spending may have an adverse effect on commitments to procuring and maintaining military capability, especially in the post COVID-19

era, unless the government continues to see the importance of defence as contributing to national security.

Strength of the armed forces

Malaysia possesses a reasonable body of active military manpower, retaining the fourth largest military establishment within ASEAN. Figure 6 shows a detailed breakdown for the three services of the MAF between 2017 and 2019.

The ceiling for military personnel has slightly increased from 109,000 in 2017 to 113,000 in 2020, mainly due to the intake of some 4000 navy recruits.[46] Figure 7 illustrates Malaysia's armed forces per capita, at 14 military personnel for every 1000 people, and compares this to several other ASEAN countries. The army is still considered the backbone of Malaysia's defence and the core of civil–military integration, as well as providing support to the police during internal disorders and crisis situations, which are equally important. However, the strength of the navy has become increasingly critical in the past five years as Malaysia views itself as a maritime nation becoming increasingly vulnerable to challenges to its territorial waters and resources; and increasingly due to escalated tensions between major powers in the South China Sea. There is no mandatory conscription service, though National Service for youth aged 18 was introduced for a short while from 2009 to 2017. Still, since its abolition there has been interest in whether another structured programme should be developed to engage youth into defence.[47] Despite a multi-ethic population, Malays form 95% of the MAF and the civil service, with senior MOD officials claiming that it is hard to attract and recruit non-Malays into government positions.[48] The greater involvement of youth and non-Malays in the defence force may be vital in realising the diversity and inclusion involving the whole of society, in order to best deliver value through defence in Malaysia.

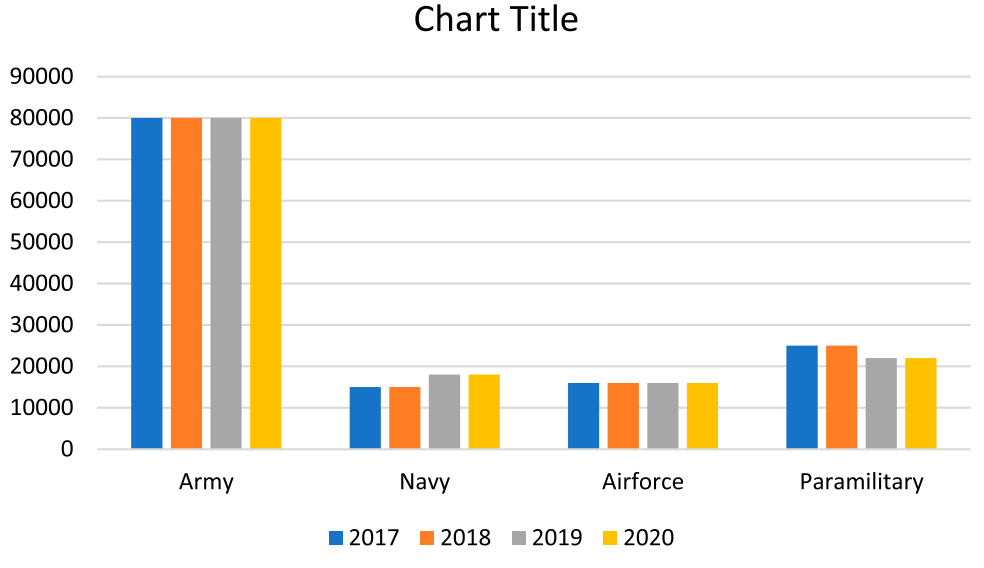

Figure 6. Malaysia: Size of the MAF by services and para-military (2017–2020). Source: International Institute for Strategic Studies, *The Military Balance 2020* (Abingdon: Routledge, 2020).

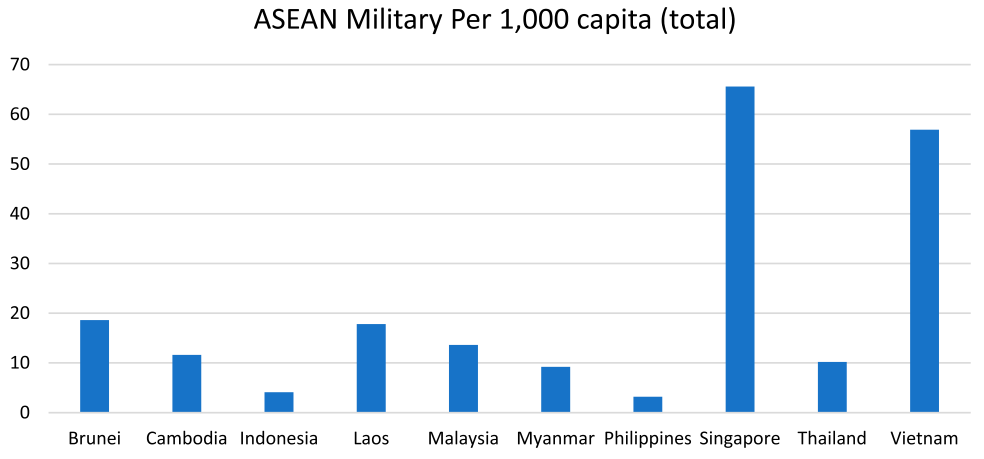

Figure 7. ASEAN: Total number of military personal per capita of 1000 people. Source: International Institute for Strategic Studies, *The Military Balance 2020* (Abingdon: Routledge, 2020).

Security challenges

Unlike some of its other neighbours in Southeast Asia (SEA), Malaysia has thus far enjoyed a continuous benevolent security environment with only minor flash points.[49] Hence, some argue that the prosperity, stability, and peace-dividend being enjoyed by Malaysians is due to government's continuous investment into diplomacy, international engagement, and defence, to create a strong and robust internal and external security environment.[50] It is also argued that the threats and challenges facing Malaysia are built on common interests and issues within ASEAN, the wider region, and globally.[51] However, some contend that this is also attributable to Malaysia's "soft approach" in dealing with its adversaries, where it refuses to be openly confrontational. There are various perspectives on the external threats facing Malaysia, considering both its strategically valuable land and sea borders, as well as the fact that East and West Malaysia are divided by the South China Sea (SEA). This paper discusses Malaysia's major external security challenges and issues in the context of the DWP and several other sources.[52]

First, the largest impact on Malaysia and SEA remains major power rivalry between China and the USA. US–China interaction, their positioning, and their competition for influence and dominance in the region pose the greatest strategic and diplomatic challenge.[53] The issues range from flexing of presence, violation of international maritime law, and encroachment into the South China Sea and countries' exclusive economic zones (EEZs).[54] The issue is exacerbated by the presence of middle powers such as the UK, Japan, and Australia, and the pressure to take sides through the formation of alliances, or regional caucuses. Another potential source of external security challenge comes from Malaysia's common issues and disputes with its neighbouring ASEAN countries. This especially pertains to land and border issues, such as human, drug, and animal trafficking (often through cartels), poaching, and other effects from conflicts within neighbouring states (spill-over), such as an influx of refugees.[55] It is estimated that Malaysia loses approximately RM 366 million in tax revenue from cigarette smuggling;[56] RM 6 billion from illegal fishing; and around 980 thousand tonnes of sea-

based produce is lost annually.[57] Another major issue is the long-term poor health and economic disruption due to haze from illegal logging and deforestation, especially in Borneo. These threats are not exhaustive, and Malaysia's rich natural resources, diversified economy, and strategic geopolitical location will continue to raise security threats.

Procurement strategy

Malaysia is a net procurer, importing almost 95% of defence equipment and services. Pre-cold war, Malaysia mostly purchased western products, primarily from the United Kingdom, Europe, and the US. However, since the 1990s, as per Figure 8, Malaysia's procurement trend has hugely diversified to include purchases from countries including Russia, Poland, Turkey, Brazil, and of late, South Korea and China. Within ASEAN, Malaysia has also procured equipment from Indonesia. Government-to-government processes and restricted tenders have been a more popular option than open tender in defence procurement decisions. There is an emphasis on VFM and seeking the lowest procurement cost, though this may not be the case in practise where technical specification and offsets can also be the deciding factor. Offsets or industrial collaborative programmes (ICP) are mandatory as part of international defence procurement above a specific threshold. Since 2009, several large contracts such as the 8-by-8 armoured vehicles, and the littoral-combat ship (LCS), were awarded to local prime contractors, with the expectation of a faster rate of technological absorption and a scaling up of indigenous capability.

However, Malaysia's defence procurement environment still struggles due to a lack of knowledge in threat assessment, which leads to a subsequently poor understanding of military requirements. Other procurement issues include acknowledging the wider whole-life-cost of a capability, and compatibility during systems integration processes. Another consideration is the need to balance between total dependence on a single source, and the procurement strategy of purchasing a small number of platforms and

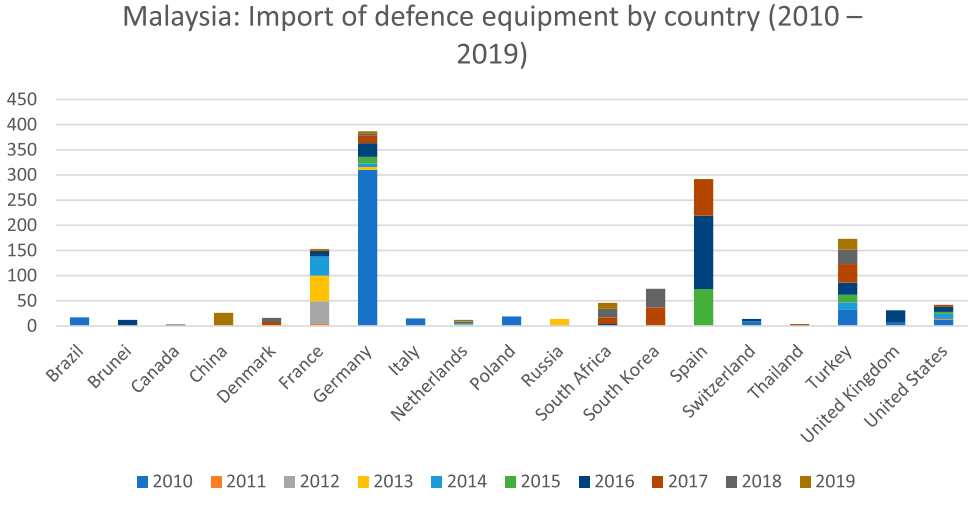

Figure 8. Malaysia: Import of defence equipment by country (2010–2019). Source: Stockholm International Peace Research Institute (SIPRI), *Yearbook 2019*: (Stockholm, Sweden 2019)

systems from a diverse range of contractors. Integrating all of these systems to make them work could be logistically challenging, hugely expensive and inefficient.

How has defence demonstrated value in the Malaysian context?

Delivering value at the primary level: protection and safety

The DWP states that the primary role of the MAF is to defend the nation's interests and protect its people against any form of external aggression. Articles 74 and 77 of the 1972 Armed Forces Act establish the roles and functions of the three services – Army, Navy and Air Force.[58] Malaysia's primary defence value and the ability to deter aggression from foreign nations is measured through the state of readiness of units and platforms.[59] The concept of readiness itself is highly contentious. For the purpose of this discussion, readiness is defined as the ability to engage at a short notice in active operations. All three services of the armed forces follow a readiness matrix. The Inspector General's office is the caretaker of the performance management system which has been developed primarily using the balanced score card method. By nature, it is hard to obtain detailed measurement indicators that are currently being used to measure the state of readiness as nothing is available in the public domain.[60] Such information is still treated as highly confidential by the MAF. However, Table 1 demonstrates an approximate picture of basic measurement indicators for the three services. The relevant information was sourced through interviews with senior military officials at MINDEF and from the wider defence industry.

The armed forces organise war-games and simulations on the probability of attack or aggression from a foreign state or non-state actors. The objective is mainly to use mathematical modelling and scenario-planning to measure the level of threat, identify gaps, and ensure that the military has sufficient capability to deter aggression. The armed forces aspire to have well-trained personal who can understand and provide accurate analysis to senior military commanders, who can feed this information to the National Security Council within the Prime Minister's office. Despite current efforts, the question remains whether the army, navy and air force are sufficiently trained and equipped to be operationally ready.

There are several key challenges facing the MAF in achieving readiness. Firstly, the difficulties in mobilising the whole of the MAF and civil service to be capable of conducting joint operations. The military is still stove-piped in its defence capability planning, procurement practices, and budgetary planning, with a "top down approach" within each service. There is also a strong sense of boundary control and inter-service rivalry which remains difficult to dissolve. Mistrust still exists between the MAF, civil servants in MINDEF, and other agencies.[61] This contributes to a lack of understanding on how to develop a real threat assessment within the MAF, leading to poor prioritisation when determining the capabilities required for war-fighting.[62] Further, capability requirements constantly change due to the competing costs of maintaining existing equipment versus purchasing new equipment.[63] Figure 9 illustrates the fighting capability across the three services, with MINDEF investing heavily in traditional platforms such as ships, armoured vehicles, and aircraft systems, as opposed to air defence systems, sensors, or missiles.

These challenges are exacerbated by buying an assortment of these packages from a variety of sources, leading to a subsequently high cost of maintenance and logistical

Table 1. Malaysian armed forces readiness.

Army	Navy	Air force
• Situational force scoring matrix is used. • One collective training and at least one live-fire field exercise per year. • Brigade HQ to undergo infield training exercises (FTX) 3–4 times a year • Command Post Exercise (CPX) to demonstrate that they can conduct command and control.	• Navy strategy map provides the mechanism for ensuring readiness on a daily, weekly, monthly and annual basis.[a] • This is monitored by the operational commanders as well as the Navy inspector general's office.	• Flying hours for helicopters, transport and fighter aircraft at minimum of 10 h per month to maintain qualified pilots who are operational ready. • Quarterly test provides additional qualification • Additional biannual qualification, (not compulsory) mainly long distance flying and physical assessments • Annual checks on overall operational and physical fitness of the pilot.

[a]Tentera Laut DiRaja Malaysia, *Navy Strategic Plan– 2013–2020 V2*, http://www.navy.mil.my/index.php/en/about-us/statement-of-direction/stategic-plan (accessed June 22, 2020).

support. The last MINDEF budget sanctioned for this purpose five years ago was insufficient and did not factor in the escalating cost of maintenance, repair, and overhaul (MRO) activities. For example, the air force remains unable to conduct modern air operations with the existing overly diverse range of aircraft. Therefore, the government must undertake a severe restructuring of the air force with a view to reducing the variety of frames in their inventory.

The DWP has identified a long shopping list of platforms and systems to be acquired by the MAF to close this capability gap. These items are focused on emerging technologies such as artificial intelligence; cyber capabilities; robotics; Network Centric Operations (NCO); and Command, Control, Communication, Computers, intelligence, surveillance, targeting, acquisition and reconnaissance (C4ISTAR).[64] However, meeting these requirements is costly and requires significant investment, especially to upgrade or buy new platforms and sub-systems. This leads to the current situation, where the Malaysian government must consider if it can fulfil its military capabilities with only 1% of GDP allocated to defence spending.[65] Malaysia's recent defence spending pattern seems to contradict the above aspirations, with major budget reductions followed by an overall reduction in defence spending. Hence, hard decisions must be made to balance investments amongst operational training, equipment, systems, and other areas.

Delivering value at the secondary level: socio-economic prosperity

It is harder to measure value from defence at the secondary level. The DWP mentions the role of the defence industry as double-pronged: a platform to support the MAF at the front-line of defence, but also as a medium that contributes to highly skilled employment, economic redistribution through regional cluster development, opportunities for diversification through the enhancement of supply chains, and SME development, growth, export, and innovation.[66] It is also argued that offsets policy is useful for defence industry growth, economic diversification, and foreign direct investment. The offset value for 50 programmes and 250 offset projects amounted to RM 32 billion between the periods of 2015 and 2020. It is estimated that around 3000 jobs were generated, 1000 engineers were trained for high skilled work and 500 local companies benefitted through new business opportunities.[67]

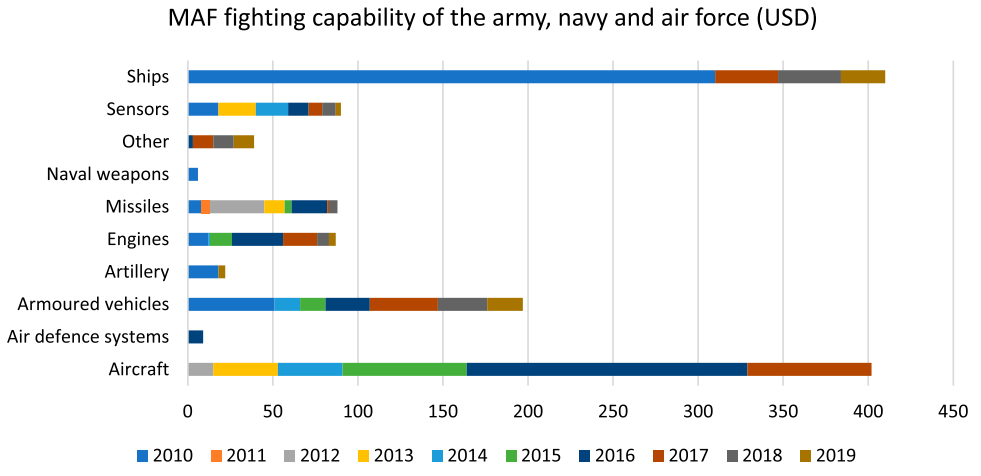

Figure 9. MAF fighting capability of the army, navy and air force (USD). Source: Stockholm International Peace Research Institute (SIPRI), *Yearbook 2019*: (Stockholm: Sweden 2019)

Figure 10 provides a detailed breakdown (2015–2020) in terms of offsets distribution, where 51% of the offsets credits were allocated to local content or industrial development; 35% towards technology development; 9% to investments in marketing and branding; 3% to capability development and MRO; and 2% to education and training. [68]

Since 2005, MINDEF has made a concerted effort to increase defence R&D funding. Table 2 shows the R&D budget between the 8th and 11th Malaysia Plans (2005–2020) for the Science & Technology Research Institute for Defence (STRIDE), a government research organisation under MINDEF. Although there is a significant increase from RM 2.2 million in 2005 to RM 92.2 million under the 11th Malaysia Plan (2016–2020), this is still a meagre sum compared to the total defence R&D budget of countries with a strong innovation culture such as Singapore, South Korea, and Israel.[69] That said, the total R&D figure does not capture the R&D budget of the defence industry and universities undertaking defence or dual-use research in Malaysia. Currently, STRIDE, National Defence University Malaysia (NDUM), and a few other universities and research organisations are involved in defence R&D. Considering the negligible size of government defence R&D investment, it is unsurprising that there is little hard evidence of patents, licenses, key technology spin-outs, or start-ups, let alone publications of international standing. Overall, defence R&D investments have not yielded substantive benefits.

Malaysia has yet to penetrate the defence export market, but has made headway with dual-use exports. Offsets has been used to enter the international defence supply chain for large OEMs, with companies such as Composite Technology Research Malaysia (CTRM), Contraves Advanced Defence (CAD) and Sapura Defence exporting parts and components.[70] The defence sector has also been a catalyst to the development of several industrial clusters around Malaysia, including a maritime cluster in Lumut; an aerospace cluster in Subang; and an automotive cluster in Pekan. These clusters contribute mainly towards dual-use industrial activities that assist in creating wider socio-economic impact and long-term multipliers. However, the sustainability of these clusters is highly contentious. Participation from commercial entities, the level of civil-defence integration, assessing the real value of collaborative activities and the level of integration

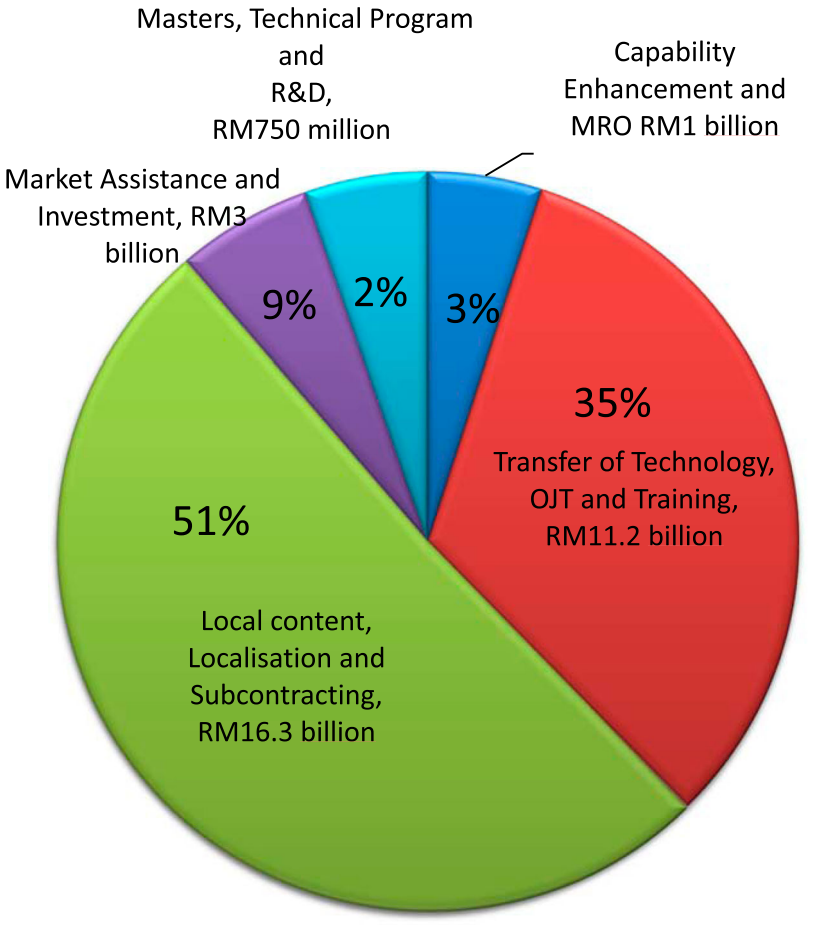

Figure 10. Malaysia: Distribution of Offsets credit value (2015–2020). Source: *Defence Industry Division,* Ministry of Defence, Malaysia, 2020, May 4.

Table 2. Malaysia's Defence Spending.

Malaysia plan	Development budget for STRIDE
8th Malaysia Plan 2005–2010	RM2.2 million
9th Malaysia Plan 2006–2010	RM17.5 million
10th Malaysia Plan 2011–2015	RM10 million
11th Malaysia Plan 2016–2020	RM92.2 million

Source: Science, Technology and Research Institute for Defence (STRIDE), Ministry of Defence, Malaysia.

within these clusters all pose challenges. Several SMEs as shown in Appendix A were outsourced work through defence contracts and offsets agreements.

Hence, there is question of whether defence spending allocations towards R&D, offsets, and sustaining a defence industry are commensurate with the expected outcomes.

Despite arguments against the economic value of defence to the Malaysian economy, Malaysia has been successful in using defence spending for dual-use activities and in capturing commercial business and technology. The defence industrial sector that began with a strong footing in the 1980s and 1990s, and seemed to be on an upward trajectory, has slipped in the past 10 years due to a lack of vision and focus, poor leadership, and mismanagement of funds within the defence environment.[71] The defence industrial sector has had difficulties in adapting to the changing defence ecosystem, struggling to embrace the adoption of new innovative ideas in developing the sector.[72] Overdependence on the government as the single source of contracts, corrupt procurement practises, a lack of appetite for investment into innovation, and low technological absorption capability have combined to create a gloomy outlook for this sector.[73] Despite huge investments into the defence industry sector, R&D, as well as offsets, there is an overall lack of compelling evidence that there have been substantive contributions to the economy from defence.[74] Despite more than 20 years of investment into offsets, Malaysia's defence industry sector has not progressed and is still hugely dependent on foreign suppliers. Furthermore, recent controversial decisions around the trading of commodities such as palm oil for defence equipment may further erode the chances of rebuilding the defence industrial base via government-to-government technology transfer agreements, offsets, and industrial collaboration programmes.[75]

As Malaysia has a relatively small defence industry, stretched in terms of budget, but hugely concentrated in high-technology sectors including electronics and semiconductors, the economy will see significant benefits if the defence industry focuses its efforts and investments into dual-use technology fields such as autonomous vehicles, systems integration, data science, cyber security, radars, space technology, and battery technology.[76] Defence technology should be strategically positioned not just for deterrence, but as a contribution to overall national industrial policy focused on dual-use technology. There is a need to engage larger defence companies (primes) with SMEs to tap into commercial technologies, and encourage open innovation, as most technological innovation today is a spin-off from smaller SMEs and start-ups. The Defence Industry Blueprint is said to address some of these shortfalls and encourage the development of strategic drivers to focus on how the defence industry could be more effective, but this is yet to be seen.[77] There is also mention that 10–15% of all nominal offsets value from industry collaboration will be allocated for R&D purposes.[78]

However, there are many unanswered questions concerning the implementation of allocated funds, and whether there will be similar commitments from the industry in the form of matching grants to access the funding. Further issues lie in accountability, disbursement criteria, as well as selection of projects. Perhaps now is the time to develop a separate technology-based entity to support human capability development in emerging technology areas, such as C4ISTAR and NCO, by reaching out to non-traditional defence suppliers, small- and medium-sized enterprises and academia, as well as traditional defence suppliers, in order to develop new capabilities for Malaysia's defence sector.[79]

As current trends demonstrate that most of the emerging technology innovation originates from the commercial sector, defence must strive to gain access to such technologies as robotics, autonomous vehicles/vessels, cyberspace, artificial intelligence, and space. The offsets funding allocated to defence R&D should be governed appropriately

and used for defence-specific technologies that cannot be offered by the commercial sectors such as radar, missile technologies, weapons technologies, and ammunition. The R&D allocation could be more effectively utilised by introducing more attractive incentives, such as the patent box scheme whereby companies receive tax credits in return for money spent on R&D. [80]

Furthermore, the civil offsets programme requires restructuring in order to maximise technology transfer from civil prime companies. This is necessitated by the fact that emerging technologies in civil sectors reside with tech giants such as Google, Facebook, Apple, Microsoft, and Uber. The government should also set up an organisation[81] that funds and capitalises on innovation to support Malaysia's defence prosperity and value.[82] This should be supported by the building of an innovation network consisting of government, private sector, academia, and industry to fund and supply emerging defence industry and SMEs with both human and physical capital, as well as developing innovative ideas that can be translated into products and services.[83]

The Malaysian defence sector also performs secondary roles in delivering valuable societal services such as carrying out humanitarian and disaster relief; search and rescue; and non-combatant evacuation operations as part of the United Nations (UN) charter and protection of critical national infrastructure. Malaysia is part of the ASEAN Humanitarian Aid and Disaster Relief (HDRF) military readiness group. In 2010, Malaysia wanted to demonstrate leadership as part of UNHRD and set up a World Food Programme (WFP) logistics centre at Subang airport, acting as a centre for humanitarian relief items within 48 hours of crisis. The armed forces also collaborate with the Federation of Red Cross, Red Crescent Societies (IFRC), and the International Council of Red Cross (ICRC) to strengthen international humanitarian law. For example, the military was called to support Rohingya refugees by lending the A400M aircraft to transport medical personnel to Bangladesh in 2017.[84] The MAF have been involved in 40 peacekeeping missions; the first in the Republic of Congo (1960–1964) and most recently in Yemen (2019) till now. Other active missions include Darfur and South Sudan since 2007, Liberia since 2003, West Sahara since 1991, the Philippines since 2004, Lebanon since 2007, and Bangladesh since 2017.[85] The COVID-19 pandemic also highlighted how the military supports the police force and medical professionals during a national crisis, through patrols, use of military hospitals and doctors, as well as military equipment for airlift and fast transportation.

The immediate value question is whether Malaysian taxpayers should fund humanitarian aid and peace-keeping missions in distant places. What value does this create for the citizens? One argument is that these activities demonstrate that Malaysia is a mature and reliable nation capable of contributing to collective world peace and international order.

Delivering value at the tertiary level: soft power projection

Despite being a small maritime nation, Malaysia aspires to be a SEA lynchpin for the wider region.[86] Strategically, it remains firmly supportive of the international world order and democratic values and objectives, whilst retaining a deep historical suspicion of Chinese objectives and intentions in the region. Malaysia attempts to exert its values through bilateral and multilateral engagement, joint-training exercises, and by sending

military and civilian MOD officials for training overseas. Malaysia has also built traditional partnerships with non-ASEAN countries in the region such as with India, Pakistan, and Japan, focused on joint exercises and training.

As part of defence diplomacy, Malaysia has established defence bilateral co-operation with individual ASEAN countries to enhance primary capability and save money through the sharing of capabilities. Malaysia's history of defence bilateral co-operation began with Thailand (1965) and Indonesia (1972) through the Government Border Control (GBC) agreement. Since then, it has signed a dozen other bilateral defence MOUs with Brunei (1992), the Philippines (1994), Vietnam (2008), Cambodia (2018) and Laos PDR (2019). It is in the interest of the armed forces to build strong defence links and negotiate for the procurement of common platforms and systems which can then lead to better interoperability.

The FPDA or the Five Power Defence Arrangement (1971) is the only apolitical, multilateral platform formed predominantly for joint-military exercises amongst the UK, Australia, New Zealand, Malaysia, and Singapore. The FPDA is said to contribute to Malaysia primary defence value, as the platform is used for integrated air defence capabilities, the sharing of resources and intelligence, as well as maintaining existing assets.

At the global level, the Malaysian Armed Forces have also built defence co-operation with the United States, China, Australia, France, and the UK, mainly focused on combined military exercises, courses, training, exchange of visits and intelligence discussions.[87] Platforms such as the ASEAN Defence Ministers Meeting (ADMM) and ADMM Plus are used to communicate the importance of enhancing national security and expressing how each nation views the others' power projection on overlapping conflicts.[88] Malaysian military personnel mostly attend courses at local universities, with some also attending courses and undertaking degree programmes using government and foreign-funded scholarships to prestigious universities in the US, UK, Australia, and France. [89] Military personnel are seen as a high-value human resource – especially in the technology sector – assuming that the average military career is less than 10 years in length. However, if it is significantly longer that, the value of retiring military personnel to the civil sector may be reduced.

Conclusion

This paper set out to measure the value derived from defence spending. Historically, this topic has proven to be challenging and problematic, but this does not imply that the armed forces and the defence sector do not have to prove that value is derived from defence spending and make efforts to improve the overall impact of defence. Unfortunately, few countries have tried to measure this. To do so, we constructed the TDV framework. The TDV framework, divided into primary, secondary, and tertiary levels can be applied to analyse any country's defence investment. Extrapolations using this framework should be modified by each nation according to its context. One has learned through its application that it becomes increasingly harder to demonstrate value as we move down the value-chain from the primary to the tertiary level. The paper argues that at the primary level, the most critical value measurement is associated with the level of protection and safety that is provided to a nation and its citizens by the armed forces and defence sector. This is determined by the ability of the armed forces to

deter aggression, precipitated by ensuring readiness and building sufficient capability. At the secondary level, value is measured through socio-economic prosperity, and finally, at the tertiary level, value arises through soft-power projection to demonstrate the criticality of a nation in its geopolitical and strategic positioning.

Covering Malaysia, the paper applied the TDV framework to analyse the value derived from its defence spending. The TDV was a useful evaluation tool to understand Malaysia's current value from defence spending at all levels. However, insufficient public data made objective analysis and determination of what and how to measure value challenging. The DWP is the first public document that has discussed the value derived from defence spending to the Malaysian public, despite claims that the content differs little from previously classified defence policy documents.

In the case of Malaysia, the primary role of defence was measured by the state of readiness of the MAF. There were several challenges beyond the author's limitations in obtaining sufficient data, such as operational activity irregularity in the systematic and consistent collection of such data, as well as tenuous political will in investing resources to attain higher levels of readiness.

The outcome from the secondary role of defence concerning socioeconomic prosperity resulting from defence spending has also been minimal. After almost 50 years of government investment into defence industrialisation, offsets and R&D, results have been modest. There is lack of appetite for enhancing innovative capability, addressing competitiveness and penetrating the global market within the defence industry sector. Positive outcomes include spin-offs from defence spending to developing commercial supply-chains and skills development in high-technology sectors. Further, outcomes from HRDF activities were positive where the MAF has successfully supported critical missions abroad.

Finally, outcomes from the tertiary role of defence regarding soft power projection has led to an increased status for the Malaysian defence sector in defence diplomacy, such that this successful projection as a friendly nation means it is often invited by major powers to broker peace talks in the region. In recent years, Malaysia has also increased its level of joint-exercise with neighbouring ASEAN countries and major powers in the region and globally. Malaysia has been very successful in keeping alive the dynamics and contributing actively to multilateral platforms such as ADMM, ADMM Plus and FPDA.

The valuation framework can be very fuzzy and their respective explanations are subjective – they require careful scrutiny and are not a "one-size-fits-all" framework. Further, the framework is culturally and socially dependent on what each country would like to identify as value derived from defence spending. We still have problems appraising value when it comes to buying defence or deterrence. Hence, this framework is not perfect and represents a general template that may provide a useful starting point when initiating value measurements for the defence sector. As previously mentioned, it is hard to measure value in public service delivery, let alone defence. These indicators provide guidance that should be used selectively and modified to the strategic context of each country.

There are several issues that the defence sector should consider when attempting to improve value measurement in the future. First, it is important to evaluate critically existing policy and processes that are in place to capture and manage data. Data could be

highly sensitive and will require careful handling in accordance with its classification. It is also necessary to have at least a basic platform with the right architecture to capture data on the value of defence spending. Success in this area would be seen through the ability to publish yearly reports on value derived from defence spending based on systematic analysis. However, the overall process of realising the importance of communicating value from defence spending must be driven by strong leadership that believes such efforts are vital. At the same time, there must be a bottom-up process that works to minimise the implementation gap that hinders defence value maximisation.

The TDV framework could be used as a preliminary model by other countries in Southeast Asia, the region and globally to examine defence value, understand the strengths and weaknesses that arise from the value evaluation process, and using the outcomes to develop or improve on existing defence policy and implementation. The defence community, especially politicians, policy-makers and the armed forces must recognise the importance in demonstrating value from defence spending, especially in a world where defence budget allocations are increasingly contested. The TDV framework is a work in progress and can be a useful public policy tool used as by the defence community to drive the idea of demonstrating value through defence spending.

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88. ADMM include ASEAN plus Australia, New Zealand, Japan, India, Republic of Korea and China.
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Appendix A: Malaysian SMEs that have benefitted from defence contracts

No	Company	Capability	``No	Company	Capability
1)	MTU Sdn Bhd	Produce Power Generator supply and gearbox services for Maritime	`14	Mti Sdn. Bhd	Naval Ship MRO
2)	SME Ordnance Sdn. Bhd. (SMEO)	Supply ammunition for Armed Forces	15	Caidmark Sdn. Bhd	Control& Monitoring system
3)	Daya OCI Sdn Bhd	Aircond Ship Services	16	*Composites Technology Research Malaysia* Sdn Bhd (CTRM)	Produce composite for Airbus and Boeing A400M
4)	Labuan Shipyard Engineering	Ship MRO	17	Zetro Services Sdn Bhd	Maintenance for Avionics and ground electronics
5)	Valser Sdn Bhd	Piping and maintenance pipe line for Maritime Ship	18	Destini Prima Sdn. Bhd.	MRO for aviation and Maritime
6)	D' Aquarian Sdn Bhd	servicing and provide equipment related to information technology	19	Ikramatic Systems Sdn Bhd	Simulator System
7)	System Consultancy Services	System and IT Company	20	SME Aerospace Sdn. Bhd.	manufactured parts, components, assemblies for Aerospace
8)	HHtech Engineering	Servicing air Conditioning in Ship for Maritime	21	Qdos Sdn Bhd	manufactured parts, components, assemblies for Aerospace
9)	Kembara Suci Sdn Bhd	Supple Maintenance for tank and system	22	Heitech Padu Berhad	system integration and ICT Infra
10)	Genting Etika Sdn. Bhd.	Ship MRO	23	Sapura Thales Electronics Sdn. Bhd. (STE)	harness and radion communication
11)	ATSC	Sukhoi MRO	24	Defence Services Sdn.Bhd	Tank MRO
12)	Data Quest Synergy Sdn. Bhd	MRO for Weapon system in maritime Sector	25	Astronautic Technology (M) Sdn. Bhd.	Aerospace Engineering servicess
13)	BHIC Bofor Asia Sdn Bhd	Maintenance Naval's Gun	26	Contraves Advanced Defence	Harnesses/cables

Source: Source: *Defence Industry Division,* Ministry of Defence, Malaysia, 2020, May 4.