# Artificial Intelligence Arms Race: Opportunities for ASEAN and Thailand's Defence Capability

Academic Article

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**Abstract**

This article is intended for 3 primary purposes: 1) to examine the competitiveness of the United States and China in the pursuit of global Artificial Intelligence (AI) whether it constitutes an arms race in accordance with the definition provided by Samuel Huntington; 2) to illustrate contemporary effects of the AI arms race on ASEAN military modernization; and 3) to analyze potential ways forward for Thai armed forces and defence industry in establishing AI capabilities. The study found that the competitive behaviour between the United States and China has constituted an AI arms race in accordance with Samuel Huntington's definition of arms race. Both nations actively pursue to become a world's leader in an AI related area, escalating mutual fears between each other as well as stimulating concerns globally. However, ASEAN nations, which geographically situate in the strategic arena of Asia Pacific, can benefit from the race. The rise of China and its expansion of influence within Southeast Asia provide an opportunity for ASEAN militaries to have access to affordable digital infrastructure as well as AI and AI-enabling technologies. The strategic partnership and alliance of the US in the region also bring in advanced

วันที่รับบทความ: 11 ก.พ.65 วันที่แก้ไขบทความ: 20 มี.ค.65 วันที่ตอบรับบทความ: 28 มี.ค.65

technologies and assistance to the region. This study also identifies 4 necessary measures for the Thai military and defence industry sector to employ in the development of Thai defence AI capabilities. The first is to obtain essential knowledge base on AI through international relationship with the great powers. The second is to invest in defence digital infrastructure and set up necessary systems to support the implementation of AI into the services. The third is to start using AI in a tactical level, creating familiarization for tactical operators whilst lessening distrust between man and machine. The fourth is to investigate the human factor in a collaborative relationship between human and AI. These actions will help to accelerate the advancement of the forces and increase the defence industry's capabilities to fulfill its domestic roles as well as to compete in the defence market.

**Keywords:** Artificial Intelligence, AI Arms Race, ASEAN Military Modernization, Thai Military, Thai Defence Industry

## Introduction

Technology innovation has played an essential role in international politics, including great power competition and power transitions. It generates opportunities for states to either gain more favorable or maintain status quo to ensure their survival. Arming dynamics, from arms build-up to arms race, have evidently been observed throughout history. For example, the conventional arms build-up such as machine guns, howitzers, tanks, battleships, aircrafts, and aircraft carriers enabled strategic advantages during both World War I and World War II. Later on, in the Cold War, the United States and the Soviet Union engaged in a geopolitical tension of the nuclear arms race. In recent trends, Artificial Intelligence (AI) has become the centre of focus in strategic competition as it is a key enabler for future technology. Russian President Vladimir Putin publicly stated in 2017 that whoever achieved artificial intelligence breakthrough would become the dominant of the world (Putin: Leader in articial intelligence will rule world, 2017). Accordingly, great powers like the US and China are dynamically engaging in a contest over the AI field, resulting in an AI Arms Race. In Addition, Global strategic focus has been shifted to Asia-Pacific as China's rise has caused a regional security concern as well as threatening the US hegemony status in the region, both of which unavoidably have effects on ASEAN military modernization. Therefore, this article aims to illustrate how AI Arms Race affects ASEAN military modernization as well as to examine ways

forward Thai military and defence industry in regard to AI. The paper will first identify whether the competitive behaviors between the US and China with regards to AI technology have constituted an AI arms race. Later, the article assesses effects of the AI arms race on contemporary ASEAN military modernization. Then, the paper analyzes possible ways forward for Thai military and defence industry in regard to AI technology.

**AI Arms Race**

The strategic importance of AI technology has been realized among global capitals. Many countries especially the two great powers in contemporary strategic focus, which are China and the US, have already displayed national AI initiatives. In 2017, Beijing set its vision to become the world's leader in AI area by 2030. In a similar manner, Washington released the US AI Initiative as well as setting up an AI strategy in 2019 (Scharre, 2019, p.135). This AI strategic competition does not limit to military-use AI technology. It covers a wide range of AI including dual-use technologies such as autonomy, 5G networks, machine learning, big data analytics, and quantum computing (Johnson, 2021, p.351). However, in order to understand whether this competitiveness in the development of AI and AI-enabling technologies can potentially create tremendous tension among competitors, we need to examine definitions and contexts of arms race.

Arms race is generally referred to states or coalitions' behaviour related to arming dynamics which led to both World War I and World War II, as well as the bipolar contest between the US and the Soviet Union during the Cold War. However, in general, arms race theories are strongly linked to the nuclear buildup during the Cold War period, in which the Soviet increased its defence expenditure to approximately 14 per cent of its GDP, whereas the US spent about 6 per cent with more efficiency during the same period (Lee, 2021, p.21). Samuel Huntington, an American political scientist, pioneeringly provided a very influential definition of arms race as *"a progressive, competitive, peacetime increase in armaments by two states or coalition of states resulting from conflicting purposes or mutual fears"* (Huntington, 1958, p.42). Therefore, an arms race is an action-reaction relationship between stakeholders. He further highlights that an increase in arms, either quantitatively or qualitatively, is a key element in a race. Nevertheless, an increase in arms during peacetime does not always result in arms race due to the fact that a state may need to expand its armaments for other purposes such as a domestic support to its defence industry, or a necessity to increase regardless of other states' actions (Huntington, 1958, p.42). Accordingly, there are degrees of

arms build-up and what constitutes an arms race is determined by states' behaviour in their interactive arming and in most cases their competitive behaviour tends to be extreme.

Contemporarily, many nations have invested in AI and AI-enabling technologies. Haner and Garcia (2019, p.332) identified the top five world leaders in lethal AI and autonomous weapons systems (AWS) development in 2019, which were the US, China, Russia, South Korea, and the European Union. These two scholars ranked global leaders in lethal AI and AWS by comparing their intent, capacity, and expertise (as shown in Table).

**Table** Lethal AI Arms Race

| | Intent | | Capacity | | | Expertise | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Resolve to Develop Lethal AWS | Citizen Trust in AI[a] | 2018 Defense Spending[b] (Billions) | 2017-2021 Projected Drone Spending[c] (Billions) | 2017 GDP[d] (Trillions) | Number of AI Companies[e] | 1997-2017 AI-Related Publications[f] | AI-Related Patents and Patent Applications[g] | AI Talent[h] | Top AI Talent[h] |
| United States | High | 25% | 649 | 17.5 | 19.4 | 2,028 | 369,588 | 133,941; 279,145 | 28,536 | 5,158 |
| China | High | 70% | 250 | 4.5 | 12.2 | 1,011 | 327,034 | 55,868; 66,508 | 18,232 | 977 |
| Russia | High | 40% | 61 | 3.9 | 1.5 | 17 | * | * | * | * |
| South Korea | High | 17% | 43 | 1.9 | 1.5 | 26 | 52,175 | 69,158; * | 2,664 | * |
| European Union | Mixed | 29%** | 281 | 8** | 17.3 | 859** | 425,166** | 45,521**; 233,050 | 41,459** | 5,111** |

*Data not available. **Data only partially available on some European Union (EU) member-states. Figures are under-estimates based on the combined data for all available EU member-states.
*Source notes:* [a](Ipsos, 2018); [b](SIPRI, 2019), [c](Statista, 2019); [d](World Bank, 2019); [e](CISTP, 2019b); [f](CISTP, 2019c); [g]The first figure is the number of patents held by each country in 2014, later figures not available due to the processing time of patent applications (Shoham et al., 2018). The second figure is the total number of AI-related patents applications by each country as of March 2019 (IPlytics GmbH, 2019). [h]AI talent refers to experts with the expertise to develop new AI innovations. AI top talent refers to leading international AI researchers in the top 10 per cent of their field, as measured by research impact and citations (CISTP, 2019a).

**Source:** Haner and Garcia, 2019, p.333

Unquestionably, the US have taken a lead in AI-related investment with greater defence expenditure than the other four nations combined. Although the majority of American citizens did not trust AI, Washington invested $4 billion for AWS research prior to 2010 with an addition of $18 billion into developing autonomy through 2020. It was also expected to spend another $17.5 billion in drone development between 2017-2021. The US leads the rank of AI expertise with the most AI companies in the world, the most AI-related publications for a single country, the most AI-related patents and patent applications, as well as the greatest number of AI researchers and top talents. (Haner and Garcia, 2019, p.332-333). China, on the other hand, is an obvious competitor in lethal AI and AWS development. It has public support and is unlikely to face any internal resistance regarding the development.

Additionally, it has a high capacity in the research and development of AI technology with approximately $250 billion of an annual defence budget. With currently strong military power, China is able to focus its resources on AI as its long-term strategic investments in accordance with its plan to become the global spearhead in AI development by 2030. Nonetheless, China faces a potential holdback by having a small pool of top AI experts with around 1,000 researchers comparing to 5,200 experts of the US. (Haner and Garcia, 2019, p.333-334). This compilation of AI-related intent, capacity, and expertise illustrates that both the US and China realize the strategic importance of AI and competitively pursue to become a leader in the area.

Another aspect of AI arms race to be examined is whether the competitive behavior is from mutual fears. The National Security Commission on Artificial Intelligence (NSCAI), established by the US Congress in 2018, emphasizes in its 2021 Final Report that Artificial Intelligence as a dual-use technology is a powerful source of power for both private sectors and countries to harness. This highlights the strategic importance of AI within an American perspective. However, the US technological predominance, which perceived as the backbone of US economic and military power, has been under threat by the rise of China. NSCAI recommends that the US Department of Defense (DoD) should prepare for future warfare by striving for military AI readiness in order to preserve its operational advantage (National Security Commission on Artificial Intelligence, 2021, p.7). In an attempt to maintain its dominance, the US has employed several measures to obstruct the Chinese from gaining ground on AI development. In 2017, the United States blocked a Chinese firm from acquiring Lattice Semiconductor, a manufacturer of chips critical in operating AI applications. It has also put many Chinese companies alleged to be involved with the development of technologies for the Chinese military on a trading blacklist, prohibiting them from exporting, re-exporting, or in-country transferring US dual-use technologies (Janes, 2021b). Meanwhile, China asserts to close a gap between itself and the United States, and to eventually take over a prime position as a global leader in Artificial Intelligence. Beijing released the 'New Generation of Artificial Intelligence Development Plan' in 2017, identifying AI as a core strategic technology and aiming to become a global center of AI innovation by 2030 (Johnson, 2021, p.361). Additionally, China would like to seize a strategic initiative, which includes strategic military

advantage, over the US. It has a potential to possess over 30 per cent of the world's share of data by 2030 (Johnson, 2021, p.362). China also invests in various critical enabling technologies, such as semiconductors, 5G networks, robotics, the internet of things, big data analytics, and quantum communications, which can contribute to the progress towards full autonomy as well as giving an edge over command and control, and a digitized battle-field. These fuel a concern within a great power competition, especially between China and the United States. Consequently, it can be perceived that the competitiveness with regards to AI and AI-enabling technologies comes from conflicting purposes between the two nations and raises a mutual fear within the Sino-American relationship. These constitute an arms race in accordance with the definition given by Huntington.

**Effects on ASEAN Military Modernization**

At present, many ASEAN countries are undergoing a military modernization in order to make their militaries more effective and more capable, as well as generating military power for strategic deterrence. With historically territorial conflicts and ongoing territorial disputes within Southeast Asia, ASEAN countries are concerned about military capabilities of other states. The distribution of material capabilities in other states relatively to their own creates an uncertainty over a motive of adversaries, resulting in an interactive arming within the region. Cutting-edge technologies such as AI and AI-enabling technologies would benefit states that have already had a research and development (R&D) base and a determination to make investments for their militaries to obtain the first-move advantage. However, with limited budgets and resources, ASEAN countries are in a very early stage of integrating AI into military applications. Therefore, ASEAN militaries do not perceive AI as a decisive strategic weapon, but as a key enabler for supporting capabilities such its utilization in big data analytics, Intelligence Surveillance and Reconnaissance (ISR), as well as command and control.

There is no doubt that AI arms race between the US and China stimulates concerns among Southeast Asian nations. Almost all ASEAN members (except Singapore) are developing countries. Although many countries such as Thailand, Indonesia, Malaysia and Vietnam try to form self-reliant military forces with an establishment of defence industries, they still depend heavily on supports from great powers for military modernization and employ hedging strategy to manage risks and better their chance

of survival in the case of a rising armed conflict between great powers. Nonetheless, apart from a threat of escalating conflicts between the great powers, AI arms race can potentially benefit ASEAN military modernization in 3 primary ways.

The first is that ASEAN states can benefit from the Chinese expansion of AI-related technology infrastructure in the China's Belt and Road Initiative (BRI). Along with an effort to connect China with major Eurasian and African nations via infrastructure, trade, and investment on the BRI, Beijing has laid a plan to construct massive digital infrastructures, creating a 'Digital Silk Road'. In 2016, the Chinese State Council issued *"the 13th Five-Year Plan for National Informatization"*, encouraging Chinese Internet Companies to participate in constructing an Online Silk Road (Shen, 2018, p.2684). Later on, in 2017, President Xi Jinping emphasized the vital role of the Digital Silk Road during the first BRI forum in Beijing and called for the integration of next-generation network technologies such as artificial intelligence, quantum computing, big data, and cloud computing into the BRI (Shen, 2018). This expansion of digital infrastructures through the BRI could be a key enabler for ASEAN military modernization. For example, affordable, high-quality communication technology can help to expand wireless communication networks as well as facilitating command and control. Technologies such as 5G networks can increase the real-time situational awareness in an operational area. In addition, digital infrastructures can enable the development of AI, feeding information for machine learning and big data analysis, as well as supplying data for military commanders' decisions.

Secondly, the Belt and Road Initiative brings about a growing network for research and development. An increase in scientific investments in BRI nations help China to emerge as a scientific partner of choice for a majority of developing countries. For instance, in 2019, Siam Cement Group (SCG), Thailand's largest cement maker and industrial conglomerate, has signed an agreement with the Chinese Academy of Sciences (CAS) to develop an innovation hub for five industries, including smart cities, artificial intelligence and robotics, high-value chemicals, new energy business, and environment and sustainability (Apisitniran, 2019). In 2020, Thailand's Defence Technology Institute (DTI) signed a memorandum of understanding (MoU) to cooperate with a Chinese firm Beihang UAS in UAV research and development (R&D), production, and flight training. Subsequently, in 2021, DTI also agreed to develop a medium range tactical unmanned aerial vehicle (UAV) based on Beihang

UAS Technology's CY-9 platform for the Royal Thai Army (Jr Ng, 2021). Indonesia is another example of countries benefiting from BRI. In 2019, Indonesia acquired CH-4B UAVs from the China Academy of Aerospace Aerodynamics (CAAA) and later on, in 2020, Indonesia unveiled its first indigenous UAV 'Black Eagle' which resembles the Chinese 'CH-4B' (Janes, 2021a).

The third benefit comes from a counteraction of the US in an attempt to subdue the expansion of the Chinese influence and assertiveness in the region. Recently, the US reaffirmed its commitment in digital development in ASEAN during the 9th ASEAN-US Summit on 26 December 2021 that it would support the development of ASEAN's digital infrastructure as well as collaborate on related matters. Importantly, the US would share knowledge and best practices on the responsible design, development, and deployment of AI with ASEAN members. It would also promote partnerships for AI research and development (R&D) as well as encouraging capacity building activities regarding the responsible use of AI (Association of Southeast Asian Nations, 2021). Additionally, the US has used UAVs as a means of consolidating relationship with ASEAN nations. In 2019, it awarded Boeing Company with a contract to supply 34 ScanEagle UAVs together with associated accessories and technical support services as a donation to Indonesia, Malaysia, Philippines, and Vietnam (Janes, 2021a). This will help equip the 4 ASEAN militaries with autonomous vehicles as well as a relevant knowledge base for further development.

Conclusively, although AI arms race posts a potential threat to the peace and security of the Southeast Asia region, it contemporarily benefits ASEAN states. Most ASEAN countries are willing to occupy hedging strategy in dealing with great power competition and use the strategy to their advantages in modernizing their defence, increasing military powers and deterrence. They are building up their AI capabilities through supports from both the US and China, starting from digital infrastructure and autonomous equipment as initiative for their defence research and development.

## Ways Forward for Thai Military and Defence Industry

Recent Thai military modernization efforts have displayed the desire for enhanced self-reliance and a technological imperative with the consolidation of Thai defence industry through the Defence Industry Institute (DTI), Defence Industry and Energy Centre (DIEC), and services' research and development offices. However, Thai armed forces are still at an early stage of

developing and implementing AI and AI-enabling technologies into use. Thai military requires necessary infrastructure and technical knowledge for research and development. This can be achieved through cooperation and collaboration among Thai defence, defence industry, and private sector. According to the Thai government's national strategy called Thailand 4.0, artificial intelligence, robotics and digital industries are priority sectors within the 20-year plan. These industries are, thus, growing at a rapid rate, especially with an increase in availability of 5G networks. Thailand is the first country in ASEAN to launch commercial 5G services (Phoonphongphiphat, 2020). It, therefore, has an edge over other regional nations in developing AI technologies. With knowledge base from both sectors and experience withing the defence, Thai military can potentially become a regional leader in the AI capabilities.

Progressing towards AI and AI-enabling capabilities, Thai military and defence industry can deploy 4 significant measures in developing and implementing AI technologies. The first is to obtain essential knowledge base on AI. Thai military and defence industry can benefit from the dual-use characteristic of AI. The recent creation of AI and Robotics Cooperation Centre under Military Research and Development Centre (MRDC), Defence Science and Technology Department, indicates an effort to gather relevant knowledge on AI and AI-enabling technologies that can be used in the defence sector. Thai defence industry have a vital role in bridging a knowledge gap between the defence and private sector. The cooperation and collaboration with international partners will also help to boost the technical knowledge. This can be achieved through the deliberate management of hedging strategy in the AI arms race, helping to lower down the costs and at the same time reducing the risk of entrapment and abandonment within the great power competition.

The second is to invest in defence digital infrastructure and set up necessary systems to support the implementation of AI into the services. The Royal Thai Armed Forces' vision to create a digital headquarter by 2022 and to become a smart headquarter by 2037 with integration of AI as critical part has been a good step towards full implementation of AI into command and control. The Defence network centric systems should proceed with AI as a key enabler. At the moment, Thai armed forces are still quite conservative in processing data and information for command decision. To modernize this, bureaucratic works should be digitized allowing AI to access and assess for better efficiency. Technologies such as blockchain, cloud computing

and big data analytics can come into play in regards with this role. To exemplify, blockchain technology can be used to securely store defence data. Then, cloud computing can help to provide access to the data with speed, efficiency, and security. Big data analytics can also help to process the data and offer analyzed intelligence for a commander's decision. In a parallel effort, rules and regulations should be updated to allow the implementation of AI for both routine works and operations. This will encourage users to be more comfortable in using AI and allow it to ease human's workloads. Additionally, cybersecurity measures should be put into place to protect networks and data. Since digitizing information can create a chance for espionage and sabotage, heightening up a cybersecurity is a must. Thus, Thai military needs to invest in creating a cyber workforce and equip them with necessary cybersecurity systems and programs, so that they can protect the defence digital systems accordingly.

The third is to start using AI in a tactical level, creating familiarization for tactical operators whilst lessening distrust between man and machine. Thai military has begun utilizing autonomous equipment to some extent. Unmanned arial vehicles have been integrated into the force structure of all three services. Robots have also been used in Explosive Ordnance Disposal (EOD) operations. However, the use of AI in a tactical level is still limited. There is a need to expand the utilization of AI technologies in broader tactical fields. For example, AI can be used in a small unit's Combat Information Center (CIC) such as a shipborne CIC to help processing data and assist a tactical commander in making a decision. It can also be applied to an Electronic Order Battle (EOB) system to assist in the recognition of military equipment's electronic signature in an electronic warfare. Furthermore, AI can be used in recognition of acoustic signals in an underwater warfare. These implementations of AI technologies in a tactical level can help tactical operators to become familiar and comfortable with the technology, preparing human resources and leveling up the armed forces to achieve a targeted AI capability.

Fourthly, the Thai defence industry should not only develop AI technologies compatible to the need of the Thai military, but also investigate on the human factor in a collaborative relationship between human and AI. This will help to uplift the users' experience on AI and help to raise the effectiveness of military operations. Perhaps, providing a scholarship for this purpose would help to generate an understanding of human traits in using AI and the dynamic of when

and where users need AI in military operations. The study on human factors in a collaborative relationship between human and AI will help the defence industry to achieve a capability to generate a critical technology suitable for an actual requirement of the Thai armed forces for future warfare.

The four indicated measures are key primary steps for paving a way towards a modern armed force in a fast-moving world of autonomy. They require tremendous efforts from policy makers and collaboration from users. However, the potential outcomes could be essential, because they can enable both Thai military and defence industry to acquire the AI capabilities, as well as continuing to be a military powerhouse in the Southeast Asia region.

## Conclusion

Artificial Intelligence, as a dual-use technology, is considered to be a strategic key enabler for future warfare, which lead to the competitiveness of great powers especially the United States and China. This competitive behaviour between the two countries has constituted an AI arms race in accordance with Samuel Huntington's definition of arms race. Both nations actively pursue to become a world's leader in an AI related area, escalating mutual fears between each other as well as stimulating concerns globally. However, developing countries especially ASEAN nations, which geographically situate in the strategic arena of Asia Pacific, can benefit from the race. The rise of China and its expansion of influence within Southeast Asia provide an opportunity for ASEAN militaries to have access to affordable digital infrastructure as well as AI and AI-enabling technologies. The strategic partnership and alliance of the US in the region also bring in advanced technologies and assistance into the region as the United States tries to maintain its hegemonic status. Hence, supports received within the great power competition can thrive ASEAN military modernization, and at the same time initiate the self-reliant aspect of their defence. Accordingly, Thai military and defence industry sector can improve the defence AI capabilities through international relationship with the great powers. Two-way capability build-up should be proceeded. From the top-down approach, standardized defence AI related infrastructure and system should be established, whilst from the bottom approach, human-machine relationship should be enhanced. These will help to accelerate the advancement of the forces and increase the defence industry' capabilities to fulfill its domestic roles as well as to compete in the defence market.

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