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**US-CHINA DIGITAL INFRASTRUCTURE COMPETITION  
IN SOUTHEAST ASIA: STRATEGIES AND IMPLICATIONS  
FOR ASEAN'S 5G FUTURE**

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**ABSTRACT**

The rapid evolution of the digital economy has significantly heightened global competition between the United States and China, especially in the area of digital infrastructure development centred around 5G technology. This competition situates the ASEAN member states (AMS) at a strategic intersection of these two superpowers, compelling them to manoeuvre through a complex geopolitical landscape. This study seeks to analyse the strategies that the United States and China are deploying in Southeast Asia's digital infrastructure, with a particular focus on 5G technology, and to evaluate the implications for the digital future of ASEAN.

The study utilises a comprehensive literature review methodology, scrutinising relevant scholarly articles, policy documents, and reports from the period 2013 to 2023. Despite the United States' escalating security concerns regarding Chinese technology, the AMS has opted for a balanced and diversified approach in selecting their 5G vendors. This strategy demonstrates their attempt to harmonise technological advancement with security imperatives.

The findings indicate that AMS has preserved their strategic autonomy in the face of U.S.-China competition by diversifying their technological partnerships and avoiding dependence on any single supplier. Nonetheless, this approach presents substantial challenges, including economic vulnerabilities, security risks, and the intricacies of geopolitical entanglements. The article anticipates that AMS will continue to adeptly balance their relationships with both the United States and China, targeting digital sovereignty that aligns with their long-term developmental goals. This study contributes fresh insights into the digital geopolitical dynamics of Southeast Asia and provides valuable perspectives for policymakers and business entities operating within this complex environment.

**Keywords:** US-China competition, 5G technology, ASEAN, digital infrastructure development, digital geopolitics.

## **INTRODUCTION**

In recent years, Southeast Asia's digital economy has experienced unprecedented growth, leading the world in its expansion rate. This robust growth is underpinned by a substantial customer base exceeding 460 million and a rising rate of internet penetration. Moreover, the region's youthful demographic profile has further propelled this development, presenting numerous opportunities for the digital economy's advancement (Temasek et al., 2023). Despite these advancements, significant disparities in digital infrastructure remain, underscoring an urgent need for enhancements to bridge the digital divide. As the digital economy continues to thrive, ASEAN has become a pivotal battleground for strategic rivalry between the United States and China. This competition transcends mere economic influence, moulding the digital infrastructure that will shape the region's technological future.

Digital infrastructure serves a dual purpose within ASEAN: it is crucial for promoting digitalisation across member states and for reducing developmental disparities, thus facilitating regional integration. Nonetheless, substantial investments are still required. The involvement of external powers in these developments greatly influences their geopolitical standing in the region (Zhang, 2023). This study explores how ASEAN member states (AMS) navigate the U.S.-China competition in digital infrastructure, with a specific emphasis on 5G technology. It delves into the strategies these countries adopt to balance technological progress with security concerns, aiming to preserve digital sovereignty. By analysing the digital infrastructure strategies of the United States and China in Southeast Asia, this research enriches the existing literature on digital geopolitics and elucidates the intricate dynamics of great power competition in the area.

The structure of this study is fourfold. First, it discusses the concepts of digital infrastructure and digital geopolitics, outlining the current global landscape of digital technology competition and the challenges and dilemmas faced by AMS. Second, it reviews digital infrastructure cooperation initiatives between the United States, China, and AMS since 2013, to assess their regional digital strategies. Third, it examines the responses of five AMS to the U.S.-China competition over 5G technology. Finally, it forecasts future trends in the U.S.-China competition concerning digital infrastructure in Southeast Asia. This comprehensive approach offers a holistic view of the dynamics governing U.S.-China competition in the digital infrastructure of Southeast Asia.

## **LITERATURE REVIEW**

In recent years, the study of infrastructure has increasingly become a focal point in academic discourse, particularly with regard to the widespread use and even "weaponisation" of infrastructure by global powers for political purposes (Bueger et al., 2023). This trend highlights the growing importance of infrastructure in global affairs. Within the discourse on the expansion of overseas infrastructure by major powers, scholars have focused on two primary dimensions: power and institutions. Scholars who concentrate on power contend that major powers develop overseas infrastructure to protect their geopolitical and economic interests (Ashbee, 2021; Feitao, 2019). Meanwhile, those who emphasise institutions discuss the complex relationship between infrastructure development, technological standards, and collaborative norms (Hillman, 2019). They argue that the ultimate aim of major powers is to gain the authority to set global infrastructure standards, thereby exerting influence over the governance of international development (Maxigas & ten Oever, 2023).

Amid the strategic rivalry between the United States and China, the Belt and Road Initiative (BRI) has emerged as a significant area of academic interest. Scholars are particularly focused on the U.S. efforts to curb China's expansion into global digital infrastructure, a key facet of this geopolitical contest (Zhao, 2021). Majerowicz (2019) examines the strategic positions of the United States and China within the Information and Communication Technology (ICT) ecosystem, arguing that the United States wields structural power through its control over semiconductor technology and production equipment. This control poses considerable challenges to China and its leading technology firm, Huawei, whose dominance in 5G technology is closely tied to China's broader national strategy. Nevertheless, the United States encounters significant obstacles in curbing Huawei, notably the lack of a viable, cost-effective alternative to Huawei's 5G solutions (Rühlig et al., 2019; Tekir, 2020). These studies provide essential insights into the dynamics of U.S.-China strategic competition in the region, though research on the autonomy and adaptive strategies of Southeast Asian countries as strategic actors remains relatively sparse.

The evolution of the digital economy offers Southeast Asian countries new avenues for growth and presents several destabilising challenges. On the international stage, major powers often form exclusive cooperative agreements that can undermine the aspirations of Southeast Asian countries to maintain economic independence and avoid marginalisation. Chiappetta (2022) highlight the imperative for these nations to safeguard their sovereignty, protect their core interests, and navigate the complexities of U.S.-China tensions without being coerced into choosing sides. Moreover, advancements in 5G technology's hardware and software infrastructure have raised significant concerns regarding national security and cyber surveillance (Martinus, 2020). However, the increasing systemic pressures have somewhat constrained the major powers' operational capacities in the region, enabling Southeast Asian countries to employ asymmetric negotiation strategies to enhance their bargaining power and delicately balance pressures and alliances with these global powers (Tüter, 2019).

Further investigations into the strategic choices of Southeast Asian countries in response to U.S.-China competition reveal nuanced approaches. Chong (2023) suggests that Singapore has adeptly cultivated unique relationships with both Washington and Beijing through its active participation in ASEAN, the Five Power Defense Arrangements (FPDA), and multiple trade agreements. As a leader in the Southeast Asian digital economy, Singapore plays a crucial role in both regional and international digital cooperation and policymaking. Zhang (2023) examines the United States and China's efforts in ASEAN connectivity initiatives, noting China's predominant influence over Indonesia's digital activities and Vietnam's preference for collaboration with the United States. Kuik (2024b) discusses how Malaysia and other Southeast Asian countries employ hedging strategies to balance economic growth against security risks, maintaining vigilance over the potential security implications of technological collaborations. Within the context of U.S.-China competition in the Indo-Pacific, the favourable views toward China in Thailand's digital e-commerce sector exemplify the complexity of regional interactions (Lin et al., 2020).

Despite these contributions, the literature on digital economic infrastructure in ASEAN remains somewhat fragmented, with a lack of in-depth analysis of the specific applications of technologies such as 5G within various national policy frameworks. This study addresses this gap by adopting a regional perspective, conducting a comprehensive analysis of the practices of five AMS in developing 5G infrastructure, and exploring the long-term implications of U.S.-China competition for the region's digitalisation efforts.

## **METHODOLOGY**

This study conducts a meticulous literature review aimed at thoroughly analysing the strategic competition between the United States and China concerning digital infrastructure development in Southeast Asia. It specifically focuses on the implications of 5G technology adoption by the AMS. The methodology employs a systematic approach, incorporating a broad array of scholarly articles, policy documents, and reports from the period between 2013 and 2023. The criteria for literature selection were based on the relevance to digital infrastructure, explicit discussions of the U.S.-China dynamics, and their impacts on the AMS. This process enabled a focused examination of the existing discourse, identifying predominant themes and trends.

Additionally, the study conducts targeted case analyses of five AMS: Singapore, Malaysia, Indonesia, Thailand, and the Philippines. Selected based on their rankings in the International Institute for Management Development (IMD) World Digital Competitiveness Rankings from 2020 to 2023, these countries provide a representative perspective on the development of the digital economy and strategic decision-making within ASEAN. The case studies yield a multi-dimensional understanding of how these countries are navigating the geopolitical dynamics that influence regional digital infrastructure development.

## **DIGITAL INFRASTRUCTURE AND DIGITAL GEOPOLITICS**

### **Concepts and Components of the Digital Economy**

The digital economy encompasses a spectrum of economic activities where data resources serve as critical production factors, modern information networks act as vital carriers, and the effective deployment of information and communications technology plays a pivotal role in enhancing efficiency and optimising economic structures (ASEAN, 2018; Bukht & Heeks, 2017; UNCTAD, 2019). Digital infrastructure serves as the essential foundation that enables data collection, storage, transmission, analysis, and application, acting as the backbone of the digital economy and ensuring the stability of the digital industrial ecosystem.

As shown in Table 1, digital infrastructure includes hardware infrastructure and software elements, with microchips and digital technology standards as foundational support. This infrastructure spans various modern information technologies, including 5G networks, digital hubs, and cloud computing, which collectively support pivotal sectors of the digital economy such as e-commerce, fintech, and smart cities. Furthermore, digital infrastructure extends to the digitisation and functional enhancement of traditional infrastructures on land, underwater, and in space, integrating these technologies to significantly improve performance and efficiency (Brackup et al., 2022). Among these technologies, 5G networks are particularly vital, offering enhanced capacity, reduced latency, and expanded device support, thereby driving global digital economy growth (Lewis, 2018).

The strategic significance of digital infrastructure has escalated as it plays an increasingly critical role in national economic development, national security, and geopolitics. Governments and international organisations are actively engaged in the construction and enhancement of digital infrastructure to maintain competitiveness and extend their influence in the global digital era.

Digital infrastructure development is both technology-intensive and rule-intensive. For AMS, the construction of digital infrastructure is crucial for achieving national economic development and modernisation. It also serves as a key pathway to narrow the development gap between countries and facilitate regional integration. For external powers, the capability to export their infrastructure technologies abroad is a vital indicator of their geopolitical and geo-economic influence (Lippert & Perthes, 2020).

**Table1**

*Components of Digital Infrastructure*

Digital Infrastructure	Definition
Hardware Elements	Terrestrial Wireline and fibre-optic networks and the information infrastructure these networks link, Including data centres, cloud computing infrastructure, personal computers (PCs), and other user devices.
	Cellular Wireless network infrastructure, including mobile devices
	Space Satellites and satellite terminals
	Submarine cable High-speed, High-capacity undersea Telecommunications links
Software Elements	Operating Systems, Firmware, Software, AMS and Applications.
Foundational Elements	Microchips and standards.

*Source.* RAND Corporation Report (2022, 2023).

**Origins and Concepts of Digital Geopolitics**

Geopolitics involves the interplay between geographical environments and political behaviours. In traditional geopolitics, the geographical environment is static, and nations strive to control strategic locations such as land and ports (Chuan-Ying & Shi-Yu, 2024). Conversely, digital geopolitics, while maintaining the same logic of state behaviour, operates within a digital environment driven by the continuous evolution of digital technologies. This environment is characterised by dynamism and uncertainty. Data has emerged as a central element, encompassing key nodes such as communication infrastructure—including 5G technology, undersea cables, data centres—and the algorithmic rules and computing power of digital platforms and cloud computing.

In terms of economic development, digital infrastructure provides the essential framework for the digital economy's operations, directly influencing the scale and effectiveness of data generation and utilisation. From a geopolitical and national security perspective, digital infrastructure is crucial for a country's global competitiveness. It has become a key geopolitical asset that shapes the current geopolitical landscape (Goodman & Hillman, 2017).

Constructing robust digital infrastructure is vital for nations to demonstrate their technological prowess and secure regional influence. The United States and China, as dominant forces in the global digital

economy, are in competition. The ASEAN region, noted for its significant potential in the digital economy, holds considerable geopolitical value. Consequently, AMS have emerged as a primary arena for digital competition between the United States and China. There is currently a significant demand for investment in digital infrastructure in Southeast Asia. Major external powers possess the capability to advance their infrastructure technologies in foreign territories, thereby enhancing their geopolitical and geo-economic influence and demonstrating their power projection.

### **CHALLENGES FOR THE ASEAN ARISING FROM THE DIGITAL INFRASTRUCTURE COMPETITION**

The ascent of digital technologies has redirected focus towards digital infrastructure, which now plays a pivotal role in global power dynamics. Discussions concerning infrastructure expansion by major powers increasingly centre on the digital domain, where control over advanced technologies and the setting of global standards have become new forms of power projection.

The United States and China remain the dominant players in the global digital economy, and the competition between them is particularly fierce in the ASEAN region, which boasts enormous digital economic potential and occupies a strategic geopolitical position. In conjunction with existing academic research, AMS faces dilemmas on three fronts: security, economic, and political.

#### **Security Risks**

In the realm of security, AMS countries are increasingly alarmed by the potential security risks that accompany the integration of foreign digital infrastructure, particularly within the framework of the strategic rivalry between the United States and China. These concerns encompass the risks of cyber espionage, data breaches, and the susceptibility of critical infrastructure to external manipulation (Segal, 2020; Yoo, 2022). Consequently, it is imperative for these nations to judiciously select their partners and technology providers to mitigate over-reliance on the technology of a single country and to ensure the security and reliability of their digital infrastructure. In response to these challenges, AMS countries have been proactive in diversifying their technological partnerships and strengthening their cybersecurity measures.

#### **Economic Constraints**

On the economic front, AMS are aiming to enhance market access by forging stronger economic relationships with large extraterritorial nations. However, competition in the realm of digital infrastructure may lead to "exclusive" collaborations, thereby restricting the options available to AMS. Both the United States and China have endeavoured to extend their influence through projects related to the digital economy, often resulting in limited opportunities for AMS to access advanced digital technologies, establish standards, and penetrate new markets (Martinus, 2020). This competitive landscape could hinder AMS's ability to diversify its technological base, thereby constraining its participation and competitiveness within the global digital economy. Economic limitations significantly impede AMS's capacity to develop and sustain robust digital infrastructure. The construction and modernisation of digital networks necessitate substantial financial resources, and AMS frequently depends on external capital and investments. Initiatives such as China's BRI and the U.S.'s Blue Dot Network offer divergent visions for infrastructural development, each with distinct economic

consequences (Schrag, 2023). AMS must prudently assess the long-term economic effects of these engagements, including potential dependencies on debt and the sustainability of investments.

### **Political Pressures**

Politically, AMS anticipate that extraterritorial powers will acknowledge and bolster ASEAN's central role in the regional institutional framework. Nonetheless, the digital sphere competition between the United States and China has impacted AMS's political autonomy and the latitude of its decision-making processes. The geostrategic expansion of these major powers exerts pressure on AMS to engage in the digital economy, complicating their efforts to foster economic growth while preserving digital sovereignty (Siow, 2021). It is crucial for AMS to maintain equilibrium amidst the great power competition to safeguard their political independence and prevent the erosion of their regional prominence.

## **U.S.-CHINA COMPETITION AND COOPERATION WITH ASEAN**

### **Competition Gestation Period: 2013-2017**

The BRI, launched by China in 2013, aims to establish infrastructural links between East Asia and Europe, enhancing connectivity, stimulating economic growth, and fostering international collaboration. The revelation of classified information by Edward Snowden in 2014 sparked a global discourse on privacy, security, and the delicate balance between national security and individual rights (BBC News, 2014). In response, Beijing began to develop a technologically secure and tightly regulated supply chain.

In March 2015, China introduced the "Information Silk Road" (later renamed "Digital Silk Road"), aiming to improve Internet infrastructure, promote space collaboration, establish common technical standards, and boost the efficacy of law enforcement systems in the BRI countries (Hao, 2021). In May of that same year, the State Council unveiled the "Made in China 2025" strategy designed to upgrade China's manufacturing sector and secure global leadership in advanced manufacturing and technology.

During this period, China experienced significant growth in its communications and satellite sectors. Companies like Huawei and ZTE, which previously held lesser roles in the global telecommunications market, began to command approximately 40 to 45 per cent of the global mobile infrastructure market share (Triolo, 2020), positioning themselves to potentially overtake the United States as leaders in communications. Concurrently, the BeiDou satellite navigation system has seen progressive enhancements and is now utilised for commercial purposes globally.

In 2018, China proposed the "China Standard 2035" program, aiming to set global standards for emerging technologies and achieve self-sufficiency in these domains (Briefing, 2022). By 2020, the Digital Silk Road had become a focal point of China's digital diplomacy initiatives (IISS, 2022).

### **Competition Deepening Period: 2018 - Present**

In the early phases of the BRI, the United States had not yet formulated a policy aimed at curbing the influence of Chinese technology firms or the advancement of digital technologies. Nevertheless, the United States began to express concerns regarding the challenges posed by China's technological advancements. By 2017, the United States National Security Strategy explicitly identified China as a

strategic competitor and potential adversary in the fields of science and technology. This recognition marked a significant shift in U.S. policy toward China (Bateman, 2022). Recently, the United States has implemented policy measures targeting key scientific and technological sectors such as communications, satellite navigation, and artificial intelligence. These initiatives are intended to curtail China's technological progress and signify a shift from a defensive to a more assertive and comprehensive strategy. During this intensified period of competition, the United States has endeavoured to formulate a foundational strategy for international infrastructure competition with China that integrates aspects of alliance rivalry, technological contention, and competitive financing models (Jin & Luo, 2022). As shown in Table 2, the United States' longstanding and trusted partnerships and alliances, along with its leadership role in international institutions, provide it with critical structural advantages.

At a systemic level, the United States has leveraged bilateral channels to collaborate with nations like Japan, South Korea, and the European Union. These collaborations focus on conducting cooperative research, developing critical technologies, and setting technical standards (Soyoung, 2023; U.S.-EU Trade and Technology Council, 2021). In contrast, the United States has utilised an existing small-scale multilateral process as a platform to enhance collaboration and integrate infrastructure issues within the Quadrilateral Security Dialogue (QUAD) (United States Department of State, 2024). In 2019, the "Blue Dot Network" initiative was proposed by the United States, Japan, and Australia. This program aims to provide low- and middle-income countries with alternatives to Chinese overseas infrastructure projects that emphasise transparency, accountability, and adherence to international standards, thereby offering high-quality investment and financing options. These alternatives, predominantly advocated by the United States and its allies, are designed to promote infrastructure projects that are economically viable and conform to principles of good governance, environmental sustainability, and respect for local communities (DFC, 2019). Subsequently, the United States introduced the "Partnership for Digital Connectivity and Cybersecurity" as part of its "Indo-Pacific Strategy." This initiative was designed to enhance the United States's ability to influence the technological development of emerging nations (United States Department of State, 2019). This was followed by the 5G Security Conference in the Czech Republic, the unveiling of the Prague Proposal, the launch of the Clean Web Initiative, and the initiation of the "Building Back Better World" (B3W) initiative. There was also an enhancement to the Partnership for Global Infrastructure and Investment (PGII) among various other activities (The White House, 2021). These efforts are centred on forming an alliance for a digital economy independent of China.

At the technical level, in 2020, the United States Congress passed legislation to establish a \$750 million fund to support the development of open radio access networks (ORAN). This initiative also included the formation of an ORAN policy alliance by local companies to promote the adoption of ORAN in the United States as an alternative to Huawei's 5G-RAN technology (Triolo, 2020). While promoting the transition to open architectures for 5G technologies, the United States also considers the Starlink program as a vital complement to traditional terrestrial communications technologies. The Starlink program aims to expand network coverage and enhance digital economy penetration in developing countries, thereby helping the United States establish a dominant position in this burgeoning technology sector, with significant implications for existing 5G communications systems and future space-based internet systems (Nanping & Jiajie, 2021).

In the realm of financial strategy, the United States has been diligently innovating mechanisms for funding infrastructure. Since 2018, it has restructured the International Development Finance Corporation (DFC) and enacted the Better Utilization of Investments to Lead Development Act (BUILD)

to draw additional capital into overseas infrastructure endeavours (Machlin & Sakamoto, 2019; Venable LLP, 2019). The Strategic Competition Act of 2021 proposed the creation of a "Global Infrastructure Coordinating Council (GICC)" to improve coordination among the United States agencies and foster private sector involvement. This initiative forms part of a comprehensive strategy designed to counterbalance China's significant capital investments and its hybrid financing model that melds credit with subsidies. Through the GICC, the U.S. aims to synchronise government and private sector efforts, thus broadening funding avenues, bridging financial shortfalls, and reducing investment risks in global infrastructure projects (The White House, 2022).

**Table 2**

*U.S. Builds "Indo-Pacific" Infrastructure Investment Partnership*

	Project name	Founders/Membership
2017	Better Utilization of Investments Leading to Development Act of 2018	Japan
2018	Trilateral Partnership for Indo-Pacific Infrastructure Investment	Australia, Japan
2019	Blue Dot Network	Australia, Czech Republic, Japan, Spain, Switzerland, United Kingdom
2021	Build Back Better World(B3W)	Canada, France, Germany, Italy, Japan, United Kingdom
2022	Partnership for Global Infrastructure and Investment (PGII)	Canada, France, Germany, Italy, Japan, United Kingdom, India, New Zealand, Vietnam, the Philippines, and Thailand

*Source.* Compiled by the Author.

**U.S. and China's Digital Cooperation with ASEAN**

Since the tenure of the Obama administration, the United States has underscored the importance of its alliance system's operation. Efforts have been made to address deficiencies in economic cooperation to diminish the economic reliance of Southeast Asian countries on China. In 2016, the U.S. adopted a "whole-of-government" approach to collaborate with ASEAN through the U.S.-ASEAN Connectivity Initiative. This initiative offers a strategic framework for U.S. economic engagement in the region, both presently and in the future, encapsulating four pillars: commercial, energy, innovation, and policy connectivity (The White House, 2016). Under the Trump administration, the vision for a free and open Indo-Pacific region was articulated, leveraging business community influence over ASEAN's policy-making through the Digital Asia Accelerator under the Agency for International Development (U.S. Agency for International Development, 2024). Concurrently, the U.S. broadened the U.S.-ASEAN Connections strategic framework to bolster ASEAN's digital development objectives, focusing on information and communications technology infrastructure, data policy and regulation, and digital connectivity and inclusion. The Biden administration proposed an Indo-Pacific economic framework to elevate the U.S.-ASEAN relationship to a comprehensive strategic partnership (ASEAN, 2023). It integrated digital connectivity into the clean economy sector to establish a multilateral digital economy alliance devoid of Chinese influence, thus steering AMS toward the U.S. orbit (Jiang & He, 2022; Yang et al., 2023).

Through the BRI, China has placed considerable emphasis on digital infrastructure connectivity with ASEAN, focusing on policy communication, platform construction, and the execution of practical

projects over an extensive period (Xu et al., 2023). Since 2015, China and ASEAN have engaged in collaboration across five pivotal areas: infrastructure construction, information sharing, technological integration, trade services, and cultural exchange, culminating in the establishment of the ASEAN-China Information Harbor. This initiative serves as a Digital Silk Road Gateway, fostering the exchange and application of information and communication technologies (Sohu, 2019).

Since 2017, China and ASEAN have engaged in profound discussions on cyberspace cooperation and security, leading to the formulation of the "International Cooperation Strategy for Cyberspace." This strategy has established a foundation for cooperative endeavours in cybersecurity, data protection, and cross-border e-commerce. Additionally, the "ASEAN-China Strategic Partnership Vision 2030," unveiled in 2018, underscores the importance of coordinated regional digital infrastructure development, thereby enhancing policy-level cooperation (ASEAN, 2018).

In 2020, China and ASEAN designated it the Year of Digital Economy Cooperation and introduced the "ASEAN-China Initiative on Establishing a Digital Economy Partnership," marking a new chapter in their collaboration. Subsequently, they adopted the "Plan of Action to Implement the ASEAN-China Strategic Partnership for Peace and Prosperity (2021–2025)" (ASEAN, 2020). These plans and initiatives concentrate on digital infrastructure construction, smart city development, e-commerce, and digital finance, significantly augmenting the digitalisation of ASEAN.

**Table 3**

*United States, China, and ASEAN Digital Co-operation Mechanism*

Nations	Strategy Name	Years	Main Cooperation Content
The United States	U.S.-ASEAN Connectivity Initiative (2016)	2018	U.S.-ASEAN Smart Cities Partnership
		2018	Digital Connectivity and Cybersecurity Partnership
		2019	Digital Asia Accelerator
		2019	ASEAN Cyber Capacity Development Project
		2020	ASEAN Framework on Digital Data Governance
		2020	Plan of Action to Implement the ASEAN-U.S. Strategic Partnership (2021-2025)
		2023	U.S.-ASEAN Digital Workplan 2023-2025
		2019; 2021; 2023	ASEAN-U.S. Cyber Policy Dialogue
China	The "Digital Silk Road" (2015)	2015	ASEAN-China Information Harbour
		2018	The ASEAN-China Strategic Partnership Vision 2030
		2019	ASEAN-China Leaders' Statement on Smart City Cooperation Initiative.
		2019	ASEAN-China Joint Statement on Synergising the Master Plan on ASEAN Connectivity (MPAC) 2025 and the Belt and Road Initiative (BRI)
		2020	China-ASEAN Digital Economy Partnership Initiative
		2022	The ASEAN-China Partnership on Digital Economy Cooperation (2021-2025)

Source. Compiled by the Author.

## **Disparities in Strategies for Overseas Digital Infrastructure Development between the United States and China**

As shown in Table 3, both the United States and China are actively seeking high-level frameworks for digital economy cooperation with ASEAN countries. The competition between the United States and China in developing overseas digital infrastructure not only illuminates their distinct national interests but also underscores fundamentally divergent strategic approaches. These differences are rooted in their unique political, economic, and technological contexts and are explored in this study through analyses of strategic vision, geopolitical objectives, and implementation processes.

At the strategic level, China's approach is primarily encapsulated in the BRI and the Digital Silk Road. This strategy is propelled by an ambition to extend its global economic influence and to promulgate its technological standards across developing regions. Characterised by state-driven initiatives, China rapidly channels capital and technology through enterprises closely aligned with national strategic objectives. This method facilitates the integration of digital infrastructure projects with broader economic and geopolitical goals.

In contrast, the United States' strategy places significant emphasis on the utility of alliance networks and multilateral mechanisms in the arena of overseas infrastructure. It promotes a rules-based international order and underscores the importance of transparency, sustainability, and high standards in infrastructure development. The United States endeavours to counterbalance China's burgeoning influence by presenting alternative infrastructure projects that adhere to international norms and governance standards, thus appealing to nations that prefer to avoid potential dependencies on Chinese investments.

These strategic differences are also manifest in their geopolitical objectives. China utilises its infrastructure projects as instruments to expand its geopolitical influence, establish economic dependencies, and secure strategic footholds in crucial regions. The deployment of Chinese technology, especially in critical sectors like 5G infrastructure, further extends China's reach by embedding its technological standards into the digital ecosystems of developing countries.

Conversely, the United States leverages its infrastructure strategy to fortify alliances and partnerships, aiming to cultivate a coalition of nations that supports a free and open digital environment. The United States' strategy seeks to curtail Chinese influence by offering infrastructure solutions that emphasise democratic values, transparency, and respect for sovereignty. This approach also involves leveraging technological innovations, such as the ORAN and satellite-based Internet services, to provide secure and flexible alternatives to Chinese technologies.

China's government-driven model enables rapid decision-making and mobilisation of substantial financial resources, which are often sourced from state funds, concessional loans, and public-private partnerships (Tüter, 2019). This model has rendered Chinese firms highly competitive and appealing to developing countries that require swift infrastructure development. Nevertheless, it has also sparked concerns regarding debt sustainability and the transparency of project financing.

On the other hand, the United States leads in stimulating infrastructure financing through the private sector and has established financing consortia with allies to support its strategic objectives. This approach necessitates the coordination of diverse stakeholders, including government bodies, private entities, and international organisations, thereby presenting challenges in mobilising comparable levels

of finance (Feitao, 2019). While the United States excels in technological innovation and adheres to stringent standards in project implementation, its projects often require more time to materialise.

Currently, China's state-led rapid deployment model and the technological and cost leadership of its tech firms have secured a foothold for China's digital infrastructure in developing regions. Meanwhile, the United States continues to rely on its robust alliance networks and technological expertise to offer sustainable, high-standard alternatives. These contrasting strategies define the current competitive landscape and will likely shape the future trajectory of global digital infrastructure development as nations assess the benefits and risks associated with alignment with these two superpowers.

### **TECHNOLOGY SELECTION IN 5G INFRASTRUCTURE DEVELOPMENT IN ASEAN-5**

5G technology is pivotal for the digital transformation of both the economy and society, playing a critical role in the development of e-commerce, fintech, and smart cities. Additionally, it serves as a vital channel for national data transmission and is essential for achieving connectivity across the ASEAN region. Currently, 5G technology has emerged as a central battleground in the digital geopolitical tensions between the United States and China, epitomising the nature of digital strategic competition between these two superpowers.

The ASEAN-5 demonstrates significant potential in the 5G market and currently leads globally in terms of network speed. It is anticipated that by 2025, the number of 5G subscribers in the ASEAN region will surpass 200 million, with penetration rates expected to reach between 25% and 40% in key countries (Hari, 2019). Moreover, total 5G revenues in the ASEAN region are projected to increase from USD 1.64 billion in 2022 to USD 7.43 billion in 2027, reflecting a compound annual growth rate (CAGR) of 35.3% (Research and Markets, 2023). Given its substantial market size and high demand for technology, Table 5 demonstrates that ASEAN has become a competitive arena for several global players. Consequently, this study examines the five AMS listed in the IMD World Digital Competitiveness Ranking (2020-2023) and observes that despite security concerns expressed by the United States regarding Huawei, ZTE, and other Chinese technology companies, the AMS have not uniformly adhered to the U.S. ban on Chinese telecommunications companies. Instead, the AMS is primarily driven by their own digital economy development needs when considering the construction of 5G infrastructure. While geopolitical pressures are escalating, they have not yet profoundly affected the geo-economic landscape.

Based on the development level of their digital economies and their reliance on digital infrastructure, the ASEAN-5 can be categorised into three groups:

1. Singapore: As a developed country with a robust digital economy, Singapore excels in e-government, smart cities, and fintech, attracting numerous technology companies. It boasts increased autonomy in digital rulemaking.
2. Malaysia, Indonesia, and Thailand: These countries are medium-development states in terms of digital economy and possess significant market potential, but still face an urban-rural digital divide. They require support and cooperation from both the United States and China to build their 5G networks.
3. The Philippines: Representing cybersecurity-sensitive countries, the Philippines has a well-developed IT-BPO outsourcing industry with stringent cybersecurity and data

protection requirements. This necessitates adherence to the U.S. government's strict "clean network" guidelines to mitigate espionage risks from China.

### ***Singapore***

Singapore adopts a receptive yet cautious approach towards the implementation of 5G technology. The Prime Minister has highlighted the complexity of 5G, stating that it cannot be reduced to a simple binary decision. The primary focus is on effectively managing the integration of external technologies while prioritising cybersecurity. The Minister of Communications has emphasised that Singapore's telecom industry has not excluded any vendors and that the selection process for the 5G infrastructure prioritises robustness and security (Choudhury, 2020). Notably, Huawei has not been selected to develop Singapore's national 5G network.

### ***Malaysia***

Malaysia has embraced a flexible and balanced approach to leveraging external technologies while safeguarding national security. Former Prime Minister Mahathir Mohammad contended that Malaysia, given its limited capabilities, could benefit from the technological prowess of Chinese companies such as Huawei, despite potential security risks (Olsen, 2019). Despite global concerns, Malaysia remains committed to making independent decisions based on its security standards. The nation advocates for 5G deployment through a unified national network, constructed and managed by Digital Nasional Berhad (DNB), a government entity. It has also engaged in partnerships with Ericsson from Sweden, while still welcoming Huawei's involvement in developing regional 5G centres and digital cities. Notably, Huawei's first ASEAN 5G security centre has been established in Malaysia.

### ***Indonesia***

The Indonesian telecommunications sector is heavily reliant on Chinese companies. According to the nation's communications minister and cybersecurity experts, Huawei's equipment is extensively utilised within the country's telecommunications infrastructure and would pose significant challenges to replace in the near future (Syamsudin & Hua, 2023). The industry favours Huawei due to the cost-effectiveness of its equipment and its role in enhancing local technological capacities and workforce skills, benefits that often outweigh national security concerns. Importantly, no Chinese holdings exist in major local telecom operators, ensuring that Chinese firms do not influence Indonesian policies through equity stakes (Guild, 2023).

### ***Thailand***

Thailand, alongside the Philippines—a treaty ally of the United States—has embraced Chinese technology despite differing economic pressures. Thailand distinguished itself as an ASEAN leader by launching the first commercial 5G services. In 2019, the Thai government commenced 5G trials with the goal of deploying infrastructure across the Eastern Economic Corridor (Sharon, 2019). This initiative included collaborations with 29 domestic and international companies, including Huawei. Notably, China Mobile holds a 10% stake in True, a major mobile operator, making Thailand the only significant ASEAN state that allows Chinese firms to own substantial shares in key mobile enterprises (Rumroy, 2021).

**Philippines**

The Philippines, positioned strategically between the United States and China, is second only to Singapore in terms of its security concerns (Kahata, 2020). Faced with a challenging decision regarding the adoption of Huawei's 5G infrastructure, the Philippines must balance U.S. political pressure against its urgent need for robust digital infrastructure to support its significant IT-BPO industry. Despite these pressures, Huawei presents the most cost-effective solution for 5G implementation, creating a complex dilemma for the Philippines. Currently, Chinese vendors supply approximately 85% of the telecommunications infrastructure in the Philippines. The nation has taken steps to mitigate data security risks (Neil, 2019). Philippine telecom companies face the difficult choice of diversifying their suppliers to reduce security risks or bearing the rising costs of 5G infrastructure development. Concurrently, concerns over data security are intensifying within the Philippine Business Process Outsourcing (BPO) sector (Cuyekeng, 2021).

**Table 4**

*5G Partnership in AMS*

Nations	Telecommunication Provider	5G Vendor	Date of Announcement
Singapore	Singtel	Ericsson (Sweden)	25 June 2020
	M1	Nokia (Finland)	25 June 2020
	Starhub	Nokia (Finland)	25 June 2020
Malaysia	Maxis	Huawei (China)	3 October 2019
	Digital Nasional Berhad	Digi, U Mobile, Celcom Axiata, Telekom-Unifi, and YTL-YES	Ericsson (Sweden)
Thailand	AIS	Huawei (China)	2 February 2020
		ZTE (China)	14 June 2022
	DTAC	Nokia (Finland)	28 December 2020
		Ericsson (Sweden)	9 September 2019
	TrueMove H	Ericsson (Sweden)	27 April 2020
Indonesia	XL Axiata	ZTE (China)	12 August 2021
		Huawei (China)	27 October 2022
	Smartfrien	ZTE (China)	2 October 2019
	Telkomsel	ZTE (China)	21 June 2019
	Indosat Ooredoo	Ericsson (Sweden)	1 August 2021
		Nokia (Finland)	17 September 2021
Philippines	PLDT	Huawei (China)	1 July 2020
		Ericsson (Sweden)	1 July 2020
		Nokia (Finland)	1 February 2021
	Globe Telecom	Huawei (China)	20 June 2019
	Smart Communications	Samsung (South Korea)	28 September 2020

*Source.* Adapted from [ISEAS, 2023], with additional content by the author.

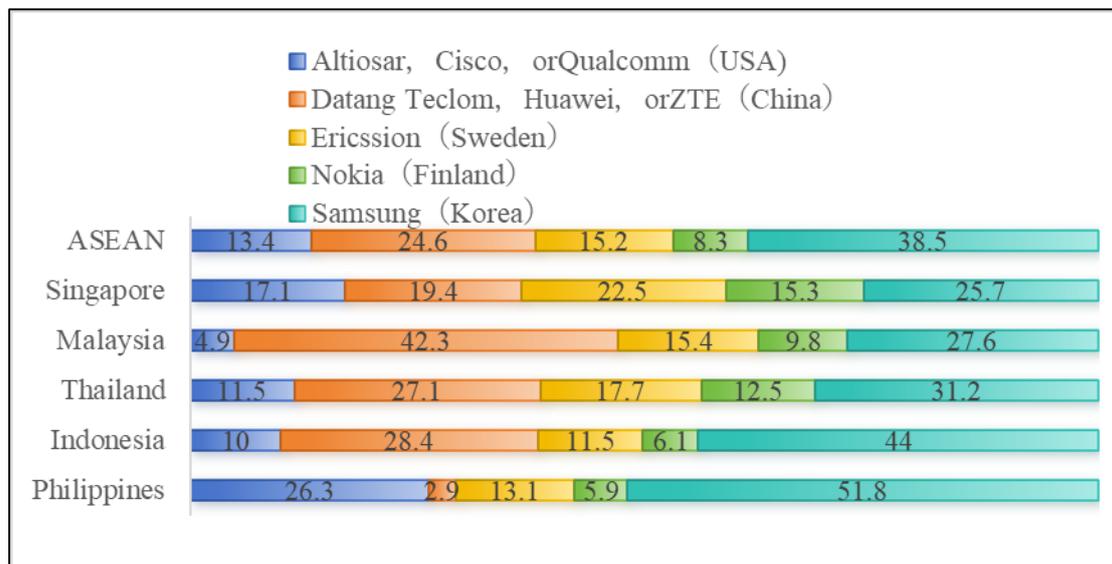
## **Strategic Analysis of ASEAN States' 5G Infrastructure Development in the Context of US-China Competition**

The deployment of 5G infrastructure in AMS epitomises the complex dynamics influenced by the strategic rivalry between the United States and China, each navigating conflicts through security, economic, and political lenses. Technologically, AMS is devoid of domestic manufacturers possessing the essential technological and industrial capabilities required to construct their own digital infrastructure. This deficiency necessitates their reliance on foreign suppliers for the development of local 5G networks. However, in terms of cooperation models, AMS has preserved a significant degree of strategic autonomy. Although foreign suppliers primarily provide hardware, software, and systems management, it predominantly remains under the control of local operators. This governance model enables AMS to maintain substantial oversight of foreign telecommunications providers.

Consequently, major AMS have adopted a pragmatic and balanced approach to 5G infrastructure development. On the one hand, they continue to foster robust cooperative relationships with China, actively engaging Chinese firms for technical support to collaboratively develop the digital economy. On the other hand, they are actively involved with the U.S.-proposed ORAN technology initiative. This bifocal strategy permits AMS to utilise the best available technologies while minimising the risks of external domination over their critical digital infrastructure. This approach not only amplifies their bargaining power but also mitigates the risks linked with excessive reliance on the technology of any single nation, be it the United States or China (Tüter, 2019). Simultaneously, AMS prioritises maintaining ‘ASEAN centrality,’ which upholds the region’s independence and pluralism and fosters mutual benefits with all involved parties while promoting openness, inclusiveness, and innovation in the digital domain.

**Table 5**

*Southeast Asia’s Preferred 5G Developers*



*Source.* The Intricacies of 5G Development in Southeast Asia 2020, ISEAS – Yusof Ishak Institute.

As illustrated in Table 5, despite overarching similarities in response strategies, AMSs are beginning to show divergence not only in their approaches to navigating the 5G landscape but also in their selection

of equipment vendors. These differences primarily arise from the disparate levels of digital economy development and the unique industrial structures within each nation. Singapore, recognised as a leader in Southeast Asia's digital economy, boasts a highly advanced digital infrastructure, robust innovation capabilities, and a strong talent pool. These assets not only provide a solid foundation for transforming its domestic digital economy governance but also ensure the country's strategic autonomy in developing digital technology infrastructure. Malaysia, with its substantial digital base, shapes its digital economy policies focusing predominantly on economic drivers and strategic considerations. Consequently, Malaysia maintains macro-level neutrality while pursuing inclusive yet selective multi-level partnerships with various global powers (Kuik, 2024). In contrast, Indonesia and Thailand display a preference for Chinese 5G technology, primarily attracted by its cost-effectiveness and the comprehensive support offered by Chinese firms. While these nations recognise the advantages of Chinese technology in facilitating their digital transformations, they remain cautious about the long-term implications of such dependence. This stance is starkly different from that of the Philippines, which confronts the dual challenge of deploying 5G technology from Chinese vendors like Huawei to enhance its IT-BPO sector while simultaneously maintaining its alliance with the United States. This strategy necessitates a careful balance between ensuring data security and managing the economic costs associated with 5G infrastructure.

### **THE PROSPECTIVE TRAJECTORY OF DIGITAL INFRASTRUCTURE COMPETITION IN ASEAN**

The competition in digital infrastructure between the United States and China in Southeast Asia forms part of a wider global geopolitical rivalry. This contest extends beyond mere technological advances, aiming to shape the global order in the digital era. Both superpowers regard digital infrastructure as a pivotal arena for exerting influence and as a crucial determinant in the future geopolitical landscape. Concurrently, the digital infrastructure projects spearheaded by these countries in Southeast Asia are increasingly intertwined with local political, economic, and social dynamics, leading to the securitisation of infrastructure logic. This dynamic amplifies domestic political interactions within the target countries and intensifies the competition between the great powers. Consequently, the rivalry over digital infrastructure between the United States and China is anticipated to persist for an extended period, potentially evolving beyond the current emphasis on 5G technology.

Represented by companies like Huawei, Chinese firms have established a robust foundation of cooperation with AMS since the 3G and 4G eras, becoming trusted partners of governments and local businesses in the region. This collaboration has significantly bolstered the development of the digital economy in ASEAN (Bengali & Pierson, 2019). It also underscores China's commitment to acting as a responsible regional power, participating in ASEAN's development, and consolidating strategic partnerships. While commercial cooperation has been successful, it remains uncertain whether these advantages will translate into lasting political gains. Criticisms such as "too rapid expansion," "excessive scale," and "insufficient consideration of the needs of target countries" in the BRI have prompted a shift towards more nuanced policies. Perceptions such as "China dividing ASEAN" and concerns about "debt traps" have shaped Southeast Asia's pragmatic stance towards China (Shambaugh, 2018). China needs to enhance standards and regulations in infrastructure projects, improve debt sustainability, and increase procurement transparency, while also considering the actual needs and capacities of developing countries. Furthermore, China must actively engage in public diplomacy and cultural exchanges, improve its management of international public opinion, and effectively counter misinformation to foster a favourable public opinion environment for its overseas infrastructure projects.

In the arena of overseas infrastructure competition, the United States holds significant advantages beyond its robust technological capabilities. These advantages include established, trustworthy partnerships and alliances, as well as a leadership role in international institutions. The U.S. is committed to promoting a free and open Indo-Pacific region, aiming to counteract China's expanding influence. Alongside its allies, the U.S. is developing a diversified 5G network ecosystem across technological and institutional domains, thereby diminishing China's pre-existing digital infrastructure advantage. As it advocates for a transition to open architectures in 5G technology, the expansion of Starlink's satellite internet service promises substantial benefits for regions in Southeast Asia that either lack network access or suffer from poor service quality, aiding in disaster relief, remote education, and bridging the digital divide in these remote areas. The U.S. may aggressively promote the development of ORAN technology and the Starlink initiative through a "technology + market" alliance strategy, while using "national security" and "values" as justifications to exclude Chinese and other foreign low-Earth orbit satellite technologies from the global next-generation communications network market, presenting new and complex economic security challenges.

From the perspective of individual countries, AMS can utilise the U.S.-China dynamic to pursue their own interests, aiming to maximise benefits, minimise risks, and uphold independence amid great power competition. Some countries have already demonstrated the capability to implement agenda-setting strategies (Hong, 2019). Nevertheless, such a balancing strategy entails potential risks and costs, particularly in terms of economic vulnerabilities linked to foreign investment dependencies. Maintaining equidistance between the two superpowers could exacerbate these vulnerabilities.

Therefore, it is imperative for AMS to focus not only on the economic development interests of their own countries but also on enhancing internal cohesion within ASEAN. Developing a unified strategy that reflects the collective interests of the member states is essential to prevent divisions concerning digital economy issues, which could weaken ASEAN's collective bargaining power. Presently, ASEAN has established several strategic plans, such as the ASEAN Connectivity Master Plan 2025, the ASEAN Digital Integration Framework, and the ASEAN Digital Masterplan 2025, all of which emphasise infrastructure and digital innovation. By advancing connectivity construction, ASEAN can maintain its central role in regional affairs and strengthen its voice, enabling it to play a more influential role in setting international standards and norms. This involvement will shape the global digital landscape in a manner that aligns with its own interests.

## **CONCLUSION**

This study critically examines the strategic competition between the United States and China in the realm of digital infrastructure development within Southeast Asia, with a specific emphasis on the integration of 5G technology by the AMS. The investigation delineates how AMS adeptly manages this rivalry, balancing their imperative for technological progression against the geopolitical forces exerted by these dominant global powers.

Initially, this analysis underscores the pivotal role of digital infrastructure as both an instrument and a contested arena for geopolitical influence. Propelled by governmental initiatives, China has swiftly established a broad digital infrastructure network, significantly extending its regional influence. This rapid expansion, however, has sparked apprehensions among AMS concerning potential technological dependency and associated security vulnerabilities. Conversely, the United States has championed a decentralised, standards-driven model of digital infrastructure development. This approach, pursued in

collaboration with allied nations, prioritises transparency, sustainability, and adherence to the rule of law. While immediate systemic pressures from geopolitical interactions have yet to fully permeate the geoeconomic landscape, it is anticipated that the enduring intensification of superpower rivalry will increasingly politicise economic development agendas.

The findings reveal that ASEAN nations have pragmatically and judiciously embraced a balanced methodology in developing their 5G infrastructure, strategically navigating the complex web of interests posed by global superpowers. Through the diversification of technological partnerships and a deliberate avoidance of excessive reliance on any single foreign entity, these nations have not only capitalised on technological advances from both the United States and China but have also safeguarded their digital sovereignty. Nevertheless, this equilibrium is fraught with challenges, including economic susceptibilities, security dilemmas, and the intricate risks tied to geopolitical engagements. Furthermore, the differential stages of digital economic evolution across the region manifest in diverse preferences concerning 5G infrastructure providers.

From these insights, several critical conclusions emerge. First, ASEAN's strategic pragmatism has effectively allowed it to navigate the multifaceted landscape of great power competition, necessitating ongoing vigilance and adaptability. Second, the confluence of digital economic dynamics and geopolitical strategies compels ASEAN to continually advance its digital infrastructure to bolster both regional and global stature while protecting national interests. Third, amid escalating competition over digital infrastructure between the United States and China, ASEAN must persist in cultivating varied partnerships and enhancing intra-regional cooperation.

In light of these conclusions, the study recommends that future research should investigate the long-term repercussions of ASEAN's balancing act, especially its implications for regional stability and economic cohesion. Policy directives should aim at enhancing ASEAN's capabilities in digital governance, empowering the region to establish independent standards and assume a leadership role in global digital initiatives. Furthermore, enhancing multilateral cooperation within ASEAN could fortify a more robust and interconnected digital infrastructure, equipped to withstand external pressures.

In summation, this study enriches the discourse on how ASEAN navigates the intricate dynamics of digital infrastructure competition between the United States and China, elucidating strategies that enable the region to maintain autonomy while pursuing broader development objectives. Through sustained adaptation and strategic foresight, ASEAN is poised to significantly influence the evolving landscape of digital geopolitics in Southeast Asia.

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