

ASEAN Digital Community 2045 A Strategic Overview

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We hope these volumes will serve as a catalyst for advancing the digital economy in ASEAN.

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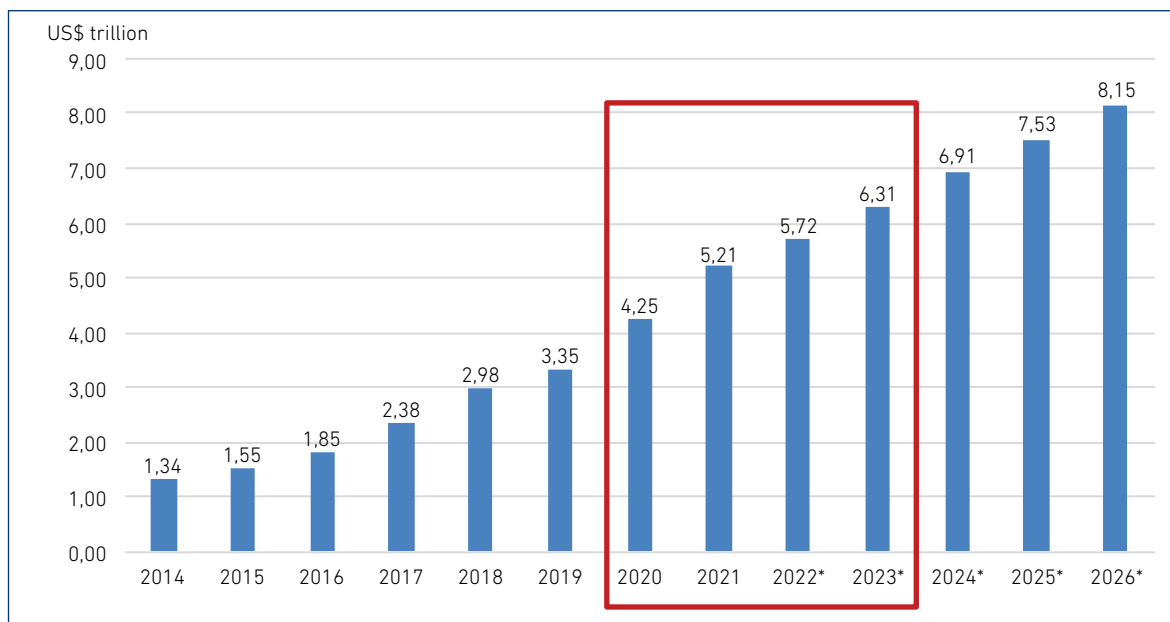
1. Introduction

Digital transformation has changed not only the way we work but also the way we live. It has shifted the focus of goods and services trade, emphasising not only what is produced and traded but also how it is traded, customised, and delivered (Ing, Grossman, and Christian, 2022). The monumental scale of this transformation is evidenced by the projected \$23 trillion value of the global digital economy by 2025, highlighting its pervasive influence on global economic landscapes (Huawei and Oxford Economics, 2017).

Amidst this digital revolution, the services sector has emerged as a beacon of resilience, particularly evident during the coronavirus disease (COVID-19) pandemic when traditional socio-economic activities faced significant disruptions. Notably, digitally deliverable services showcased remarkable adaptability, experiencing substantial growth from US\$120.8 billion in 2005 to \$483.5 billion in 2019 in Asia alone (ADB, 2022). This underscores the robustness of digital trade, which is poised to continue its exponential growth trajectory.

Global digital trade is projected to reach US\$6.3 trillion in 2023 and surpass US\$10 trillion by 2030 (Figure 1). The Association of Southeast Asian Nations (ASEAN)¹ is projected to contribute US\$360 billion to global digital trade by 2025 and grow to US\$1 trillion or about 10% of global digital trade by 2030 (Statista, 2022b). ASEAN has an immense opportunity to grow its digital landscape further and develop its leading role in the era of digital transformation.

Figure 1. Global Retail E-Commerce Sales, 2014–2026*



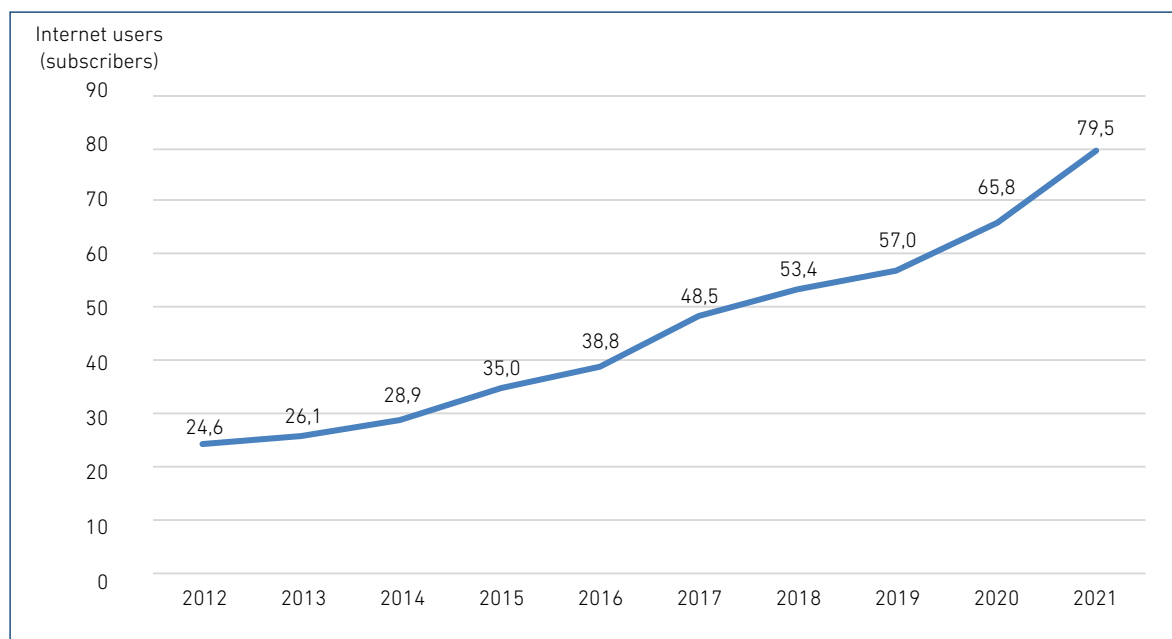
* = estimation.

Source: Statista (2022), Retail E-Commerce Sales Worldwide from 2014 to 2026. [https:// www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/](https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/) (accessed 26 May 2023).

¹ The 10 ASEAN Member States (AMS) are Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic (Lao PDR), Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam.

One of the primary catalysts propelling ASEAN's burgeoning digital trade is its youthful and digitally savvy population. In 2022, ASEAN's internet users surged to 460 million, up from 360 million in 2019 (Figure 2) – marking a notable increase of 100 million users within just 3 years of digital transformation (Google, Temasek, and Bain & Company, 2022). E-commerce (75%) and related sectors such as food delivery (71%), online transportation (64%), and online groceries (64%) dominated the digital adoption trends amongst ASEAN's internet users. In 2020, about 24% of firms received orders online, while more than 40% placed orders online (UNCTAD, 2022).

Figure 2. Access to Internet Services in ASEAN, 2012–2021



ASEAN = Association of Southeast Asian Nations.

Notes:

1. Internet users: number of internet users per 100 persons.
2. The ASEAN figures for 2020–2021 are estimated, as data for some ASEAN Member States are not available. For 2021, the figure is based on the latest available data, and data for Brunei Darussalam and Myanmar are calculated based on the number of subscriptions to internet provider companies. Consequently, there is a possibility of one person being counted multiple times if they subscribed to more than one provider.

Source: ASEAN (2022), *ASEAN Statistical Yearbook 2022*. Jakarta: ASEAN Secretariat

Another pivotal success factor in ASEAN's digital trade lies in the proliferation and efficacy of digital payments. ASEAN stands out as the world's fastest-growing mobile wallet market, propelled by a significant upsurge in internet subscribers within the region. The surge in cross-border trade over the past decade has notably contributed to the heightened utilisation of digital payments. Traditionally, cross-border trade has been plagued by prolonged processing times and exorbitant costs. Digital payments offer a remedy to these challenges by furnishing users with convenience and efficiency. In ASEAN, the total transaction value of digital payments is poised to reach \$226.6 billion in 2023, with the digital commerce sector estimated to account for total transactions of \$193.8 billion (Statista, 2023).

While the potential for digitalisation within ASEAN is vast, the region faces a spectrum of challenges ranging from infrastructure constraints to socio-cultural barriers. These hurdles underscore the imperative for coordinated endeavours aimed at unlocking the full potential of digitalisation. Section 2 provides an in-depth examination of the existing ASEAN frameworks on digitalisation from 2016 to 2023. In section 3, we delve into the intricacies of key challenges encountered in the process of digital transformation. Meanwhile, section 4 emphasises the critical necessity for ASEAN to articulate a comprehensive long-term vision for the ASEAN Digital Community (ADC) 2045, ensuring comprehensive development across all pillars of the ASEAN Community. Finally, section 5 elaborates on follow-up actions that need to be considered by ASEAN.

2. ASEAN Frameworks on Digitalisation (2016–2023)

ASEAN has demonstrated proactive commitment by instituting a range of frameworks and strategic plans designed to navigate the challenges and capitalise on the opportunities presented by the digital age. These initiatives underscore the region's responsiveness to the profound shifts brought about by digitalisation. In this section, we provide a comprehensive overview of the various ASEAN digital frameworks and work plans implemented between 2016 and 2023, highlighting the region's steadfast dedication to embracing and harnessing the potential of digital transformation.

2.1. ASEAN Framework on Personal Data Protection (2016)

During the 16th ASEAN Telecommunications and Information Technology Ministers Meeting (TELMIN) in 2016, ASEAN Member States (AMS) adopted the ASEAN Framework on Personal Data Protection. This framework emerged in response to the escalating importance of personal data in the digital economy, with the goal of establishing a unified approach to personal data protection across AMS. It aims to promote consistency and interoperability in data processing practices. Key principles of this framework include obtaining consent, providing notification, defining the purpose for data collection, ensuring data accuracy, implementing robust security safeguards, facilitating data access and correction, addressing data transfers to other countries or territories, determining data retention policies, and establishing accountability. The ASEAN Framework on Personal Data Protection serves as a valuable reference for AMS in shaping or revising their national laws and regulations concerning personal data protection.

2.2. ASEAN Digital Data Governance Framework (2018)

In 2018, the ASEAN Telecommunications and Information Technology Ministers Meeting formally endorsed the ASEAN Digital Data Governance Framework, marking a pivotal advancement in the region's digital landscape. This comprehensive framework comprises four strategic priorities, each supported by a set of guiding principles. The first priority centres on the data life cycle and ecosystem, with a focus on data integrity, access control, and security. The second priority addresses cross-border data flows, emphasising the importance of data movement while preserving trust. The third priority concentrates on digitalisation and emerging technologies, aiming to promote capacity development and upskilling. Lastly, the fourth priority delves into legal, regulatory, and policy aspects, advocating for harmonised data protection, policy accountability, and best practices in data governance across AMS. Practical implementation of the framework involves an annual ASEAN Data Protection Forum, facilitating the exchange of updates amongst AMS.

2.3. ASEAN Digital Integration Framework Action Plan, 2019–2025 (2019)

In October 2019, the ASEAN Economic Community (AEC) Council endorsed the ASEAN Digital Integration Framework Action Plan, 2019–2025 (DIFAP), to address the digital divide and foster inclusivity in the ASEAN region's digital landscape. This strategic framework aims to facilitate the integration of digital technologies and projects across AMS by outlining a comprehensive strategy for harnessing the benefits of digital transformation, promoting regional cooperation, and driving economic growth in the digital age.

The DIFAP identifies several key priority areas for digital integration, including facilitating seamless trade; ensuring data protection while supporting digital trade and innovation; enabling seamless digital payments; broadening the digital talent base; supporting emerging digital micro, small, and medium-sized enterprises (MSMEs); and establishing an ASEAN coordinating body to oversee and monitor the framework's objectives. By focusing on these key areas, the DIFAP aims to bridge the digital divide and propel the ASEAN region towards a more inclusive and digitally empowered future.

2.4. ASEAN Comprehensive Recovery Framework (2020)

Adopted at the 37th ASEAN Summit in November 2020, the ASEAN Comprehensive Recovery Framework serves as the consolidated exit strategy for the region from the COVID-19 crisis, with a focus on five broad strategies emphasising health, humanity, the economy, and digitalisation. One of these strategies centres on advancing inclusive digital transformation within ASEAN; prioritising initiatives such as e-commerce and the digital economy, e-government, e-services, digital connectivity, and information and communication technology (ICT) in education; and digitalising MSMEs. Additionally, the framework emphasises the need for investment in digital infrastructure in data governance, cybersecurity, legal frameworks, and institutional capacity.

Within this digitalisation strategy (strategy 4), the framework sets multiple objectives, including the launch of the ASEAN Access web portal, the promotion of the Go Digital ASEAN initiative for digital transformation of MSMEs, the adoption of the Consolidated Strategy on the Fourth Industrial Revolution for ASEAN, the introduction of the ASEAN Digital Integration Index Report, the implementation of the ASEAN Agreement on Electronic Commerce Work Plan, the promotion of good governance through digital innovation and digitalisation of public service, the improvement of financial inclusion, and the strengthening of data governance and cybersecurity in the region.

2.5. ASEAN Data Management Framework (2021)

The ASEAN Data Management Framework (DMF), endorsed by the First ASEAN Digital Senior Officials' Meeting (ADGSOM) in January 2021, is a comprehensive tool designed to support the strategic priority of managing data throughout its life cycle and ecosystem.

The DMF's primary goal is to facilitate the participation of businesses in the ASEAN region in the digital economy and promote effective data governance across various data types within organisations throughout the data life cycle, ensuring adequate protection of different data categories. With the DMF, organisations are better equipped to safeguard their data, instil trust and confidence in their customers and partners, and harness data for innovation. Importantly, the DMF is customisable and adaptable, allowing businesses to tailor it to their specific data management needs, covering all data types generated, collected, accessed, processed, and transferred by businesses, including both personal and transactional data. The DMF is intended for use by all private sector businesses in ASEAN, including small and medium-sized enterprises, facilitating their journey towards responsible data management and effective participation in the digital economy.

2.6. ASEAN Digital Masterplan 2025 (2021)

Endorsed by the First ASEAN Digital Ministers Meeting in 2021, the ASEAN Digital Masterplan 2025 outlines a vision for ASEAN as a leading digital community and economic bloc driven by a secure and transformative digital ecosystem, services, and technologies. To realise this vision, key economic stakeholders, including governments, regulators, and market players, are encouraged to collaborate by investing in new technologies, eliminating regulatory barriers hindering market processes, promoting digital inclusion, and providing high-speed connectivity through robust telecommunications infrastructure.

The ASEAN Digital Masterplan 2025 sets forth three essential conditions for governments and regulators to meet in pursuit of this vision: ensuring high-quality connectivity throughout the ASEAN region via telecommunications infrastructure, offering secure connections meeting the needs of end-users, and taking actions to enhance digital literacy and skills, ultimately boosting productivity.

2.7. Work Plan on the Implementation of ASEAN Agreement on Electronic Commerce (2021)

In 2021, ASEAN endorsed the Work Plan on the Implementation of the ASEAN Agreement on Electronic Commerce, presenting an adaptable framework that extends upon ongoing endeavours to stimulate regional e-commerce growth. This work plan is structured around three primary workstreams: (i) a cross-border focus, enhancing cross-border cohesiveness at the national level; (ii) a business focus, aimed at creating a conducive environment for e-commerce business; and (iii) a consumer focus, safeguarding the interests and rights of e-commerce consumers. External partners, known as 'workstream enablers', play a pivotal role in supporting these efforts through contributions to national e-commerce development, capacity-building initiatives, financing, digital infrastructure, and data collection.

The work plan encompasses various activities, including the Laws Reporting Scheme, annual business surveys, the ASEAN Consumer Empowerment Index, stakeholder engagement, and pilot projects. Within the plan's annex, each desired outcome is detailed alongside associated metrics, key performance indicators, target timelines, and the designated implementation bodies, collectively advancing e-commerce within ASEAN and fostering regional growth and collaboration in the digital sector.

2.8. Bandar Seri Begawan Roadmap (2021)

In response to the rapid adoption of digital technology driven by the COVID-19 pandemic, ASEAN introduced the Bandar Seri Begawan Roadmap (BSBR) during the 2021 virtual 53rd ASEAN Economic Ministers Meeting. The BSBR serves as a digital transformation agenda aimed at accelerating economic recovery and integrating the digital economy within ASEAN. It strives to ensure that digital transformation benefits all Member States equitably and prioritises technology as a key economic driver. The roadmap spans 2021–2025, divided into three phases: recovery (2021–2022), acceleration (2022–2024), and transformation (2025).

The recovery phase focuses on hastening economic recovery and digital technology adoption, while the acceleration builds on the DIFAP. The transformation phase seeks to establish an inclusive regional digital economy in line with the broader AEC-building agenda. The ASEAN Coordinating Committee on Electronic Commerce oversees the BSBR under the supervision of the Senior Economic Officials Meeting, with contributions from representatives of the sectoral bodies of each AMS.

2.9. Boracay Digital Declaration (2023)

In February 2023, at the Third ASEAN Digital Ministers Meeting, AMS adopted the Boracay Digital Declaration (BDD), a non-binding agreement that focuses on digital transformation and the digital economy.

The BDD highlights three core pillars: (i) fostering a digitally inclusive society, (ii) establishing a secure digital market through robust data governance, and (iii) prioritising people-centred digital transformation. It emphasises regional cooperation to harness the benefits of the digital revolution for inclusive and sustainable development. The BDD encompasses five key areas: (i) digital connectivity, (ii) digital skills, (iii) digital innovation, (iv) digital trade, and (v) cybersecurity and data protection. These areas emphasise enhancing digital infrastructure, developing digital skills, driving digital innovation, facilitating digital trade, and strengthening cybersecurity measures to build trust and confidence in digital transactions and technologies. The BDD aims to advance the digital transformation agenda within ASEAN, promoting a secure, inclusive, and digitally driven future for the region.

2.10. ASEAN Digital Economy Framework Agreement (2023)

Recently, ASEAN introduced the Digital Economic Framework Agreement (DEFA), with a primary focus on e-commerce and digital trade to establish an integrated and inclusive digital landscape in the region. Endorsed during Indonesia's ASEAN Chairmanship in September 2023, DEFA initiates negotiations set to conclude by the end of 2025. The ASEAN Coordinating Committee on Electronic Commerce and Digital Economy, in collaboration with relevant sectoral bodies and support from the ASEAN Secretariat, will oversee these negotiations.

DEFA negotiations encompass various elements, including digital trade, cross-border e-commerce, digital payments, e-invoicing, digital identity (ID) and authentication, online safety, cybersecurity, cross-border data flows, data protection, competition policy, cooperation on emerging topics like artificial intelligence (AI) regulation, and talent mobility and cooperation to facilitate the movement of digital talent. DEFA is a pivotal step towards establishing a robust digital economic framework supporting ASEAN's digital growth and integration.

Overall, the limitations of the existing frameworks on ASEAN's digital economy are rooted in a range of hurdles that hinder their effectiveness in implementation. One such hurdle is the absence of a clear enforcement mechanism, given the non-binding nature of agreements and the lack of established legal obligations. The lack of a designated source for real-time reporting on the progress of the framework's desired outcomes raises further questions about accountability and transparency in implementation. Related stakeholders and the interested public have limited access to observe actual progress on the framework's desired outcomes and objectives. Additionally, these ASEAN road maps, frameworks, work plans, and action plans are limited to economic issues, with no coverage of other key aspects such as 'security-politics' and 'socio-culture.' Digital transformation is a key issue in ASEAN. It is worth noting that, despite their promise, these frameworks do not serve as a long-term vision for ASEAN.

3. Key Challenges in ASEAN's Digital Transformation

Despite efforts to advance digitalisation, the rapid pace of global digital transformation presents considerable challenges for ASEAN, much like other developing regions. The swift digital evolution in ASEAN has brought forth a spectrum of risks and challenges, broadly falling into five main clusters: (i) data security, cybersecurity, and competition; (ii) productivity; (iii) connectivity; (iv) the digital divide; and (v) environmental sustainability.

3.1. Data, Cybersecurity, and Competition

The proliferation of digital data and the establishment of a global information infrastructure within the digital economy have ignited significant concerns regarding data security, privacy, and cybersecurity. This exchange of personal information exposes individuals and institutions to potential data misuse (Kolbanev, Palkin, and Tatarnikova, 2020). The rapid accumulation of digital data, coupled with the expansion of international networks, has led to a surge in security risks and breaches, highlighting the critical need for robust cybersecurity measures (Oppitz and Tomsu, 2018). Meanwhile, technological advancements have enabled firms to operate at large economies of scale, resulting in market concentration that can hinder competition and create barriers for MSMEs and start-ups (Nielsen, Rohman, and Lopes, 2018).

Within ASEAN, existing regulatory policies and frameworks may not adequately address emerging digital concerns, such as data protection and cybersecurity. These policies were not specifically designed to keep pace with rapid advancements in the digital landscape, potentially impeding the region's digital economy. Furthermore, varying levels of digital maturity and diverse regulatory frameworks across AMS create complexities in standardising regulations within the region. ASEAN's digital economy exhibits noticeable regulatory gaps and inconsistencies across areas such as competition, data privacy, cybersecurity, patents, and copyright laws across all Member States.

Efforts to integrate digitalisation into competition laws must be prioritised to effectively address digital market dynamics across the region. Addressing digital divides is integral to fostering fair market practices and innovation through competition laws in ASEAN. Appendix 1 on Competition Laws in ASEAN elucidates the essential role of competition laws in creating a level playing field for enterprises, particularly SMEs, and ensuring consumer protection. Discrepancies in data protection laws and enforcement mechanisms can raise concerns about data breaches, unauthorised access, and misuse of personal information, potentially hindering cross-border digital trade and investment.

While ASEAN has shown a commitment to developing best practices for data governance, disparities persist amongst Member States in the adoption of regional data governance. For instance, while some countries like Singapore and Thailand lack data localisation policies, others, such as Indonesia and Viet Nam, still require data to be stored locally (SIIA, 2022). Moreover, countries like Malaysia, the Philippines, Singapore, and Thailand have made significant strides in enacting data protection laws, although these laws are dispersed across various legislation and regulations, with certain nations having dedicated data protection statutes.

Similar dynamics extend to the realm of cybersecurity, with some Member States lagging in implementation. Viet Nam stands out for its cybersecurity laws mandating private companies to house data on local servers to ensure heightened security (Suvannaphakdy, 2022). Appendix 2 provides an overview of privacy laws in ASEAN, highlighting efforts and challenges in harmonising privacy regulations across Member States. Addressing these challenges is crucial for fostering a conducive environment for digital trade and investment within ASEAN.

In addition to the challenges of data security, cybersecurity, and competition, another significant issue affecting ASEAN's digital transformation is the taxation of the digital economy. For further insights into this complex issue, refer to Appendix 3 on Taxing the Digital Economy.

3.2. Productivity

ASEAN stands out as a region marked by diverse levels of development, with Singapore leading the pack in economic, social, and human development indicators compared with nations like the Lao People's Democratic Republic (Lao PDR) and Myanmar. This diversity in economic development and digitalisation across ASEAN has led to varying progress in digitalisation and technology ecosystems throughout the region. According to the World Economic Forum (2021), one of the most significant benefits of digital enhancement in the economy is productivity improvement. However, the differing levels of digital technology adoption are likely to exacerbate disparities in productivity levels amongst AMS.

Furthermore, ASEAN's collaborative efforts in digitalisation primarily focus on advancing digital trade, digital platforms, and e-commerce. Emphasising the importance of reducing trade costs, UNESCAP and ASEAN (2021) underscored the pivotal role of enhancing engagement in global and regional value chains to ensure that trade remains a fundamental driver of sustainable growth. Despite notable growth in the trade, finance, and investment sectors through digitalisation, there is an urgent need to expand the scope of digital transformation to include other sectors. The current limited progress in expanding value-added activities beyond these domains poses a barrier to the comprehensive advancement of ASEAN's digital economy.

3.3. Connectivity

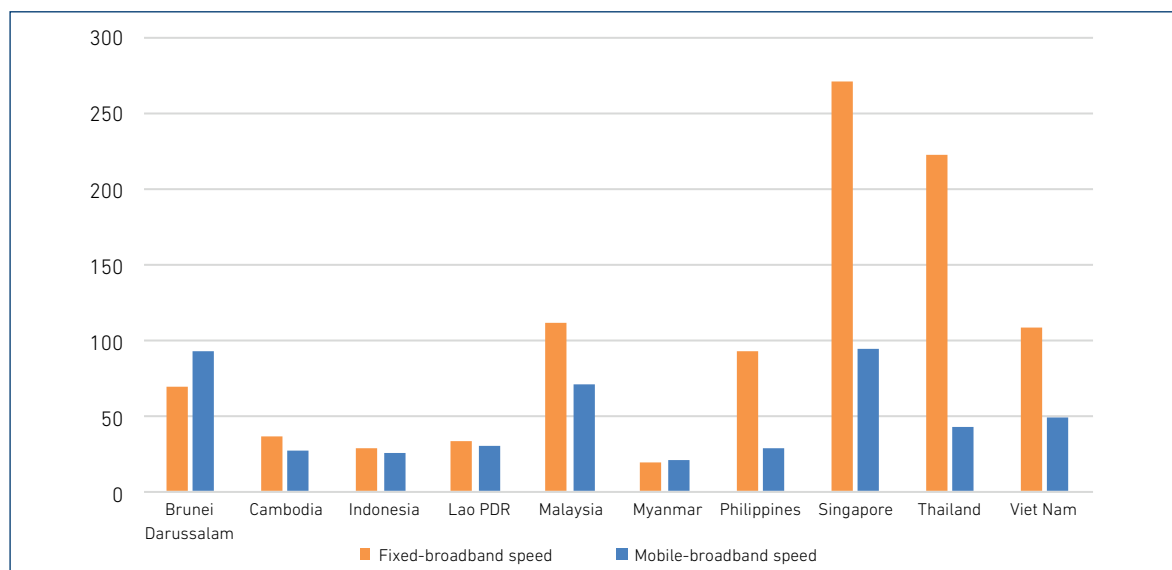
In recent years, ASEAN has made significant strides in enhancing its digital infrastructure to propel the growth of its digital economy. However, a critical challenge in ASEAN's digital transformation stems from the lack of both digital and physical enablers, including digital infrastructure and connectivity. Establishing a robust digital infrastructure and seamless connectivity is essential for advancing the digital economy within ASEAN. This encompasses various elements such as innovative networks, hardware, software, data centres, and widespread broadband connectivity – all crucial for facilitating the seamless provision of digital services. Infrastructure Asia emphasises the importance of prioritising digital connectivity, considering factors like accessibility, bandwidth requirements, affordability of data connections, and device availability to strengthen the digital infrastructure across ASEAN.

Despite progress, digitalised systems and digitally deliverable goods and services still represent a smaller proportion in the least developed countries compared with other global regions, with only 2% of low-income countries participating in digital trade. The unequal distribution of technologies due to limited capacities underscores the pivotal concern of deploying technology in digital transformation. An examination of primary indicators contributing to the digital divide – internet speed, usage, and technology production – reveals significant disparities amongst AMS. For instance, Indonesia’s internet speed stands at 21.95 megabits per second (Mbps), while Singapore’s is 211.36 Mbps, leaving Myanmar lagging at 18.35 Mbps (Ing and Markus, 2023).

Figure 3 highlights this connectivity gap, where countries like Singapore and Thailand exhibit a high fixed broadband speed while countries like Indonesia and Myanmar are considerably behind. In this digital era, the synergy of digital and physical connectivity serves as the linchpin for successful digital transformation, resonating throughout the ASEAN region.

Digitalisation holds the potential to enhance productivity and invigorate MSMEs, as highlighted by the World Economic Forum (2021). However, the divergent progress in digital advancement amongst AMS and within them could hinder the positive impacts on productivity and various economic sectors within the region. For example, the lack of robust digital infrastructure acts as a deterrent for AMS in adopting digital technologies across diverse value-added sectors. Additionally, the Logistics Performance Index score of AMS could be significantly enhanced through the widespread adoption of digital technologies in the region, as suggested by Ha and Chuah (2023).

**Figure 3. Broadband Speed in ASEAN Member States, 2023
(Mbps)**



ASEAN = Association of Southeast Asian Nations, Mbps = megabits per second.

Note: Mobile broadband is an internet service that originates from a cellular network via a SIM card. Fixed broadband is a cable internet service based on a fibre optic network.

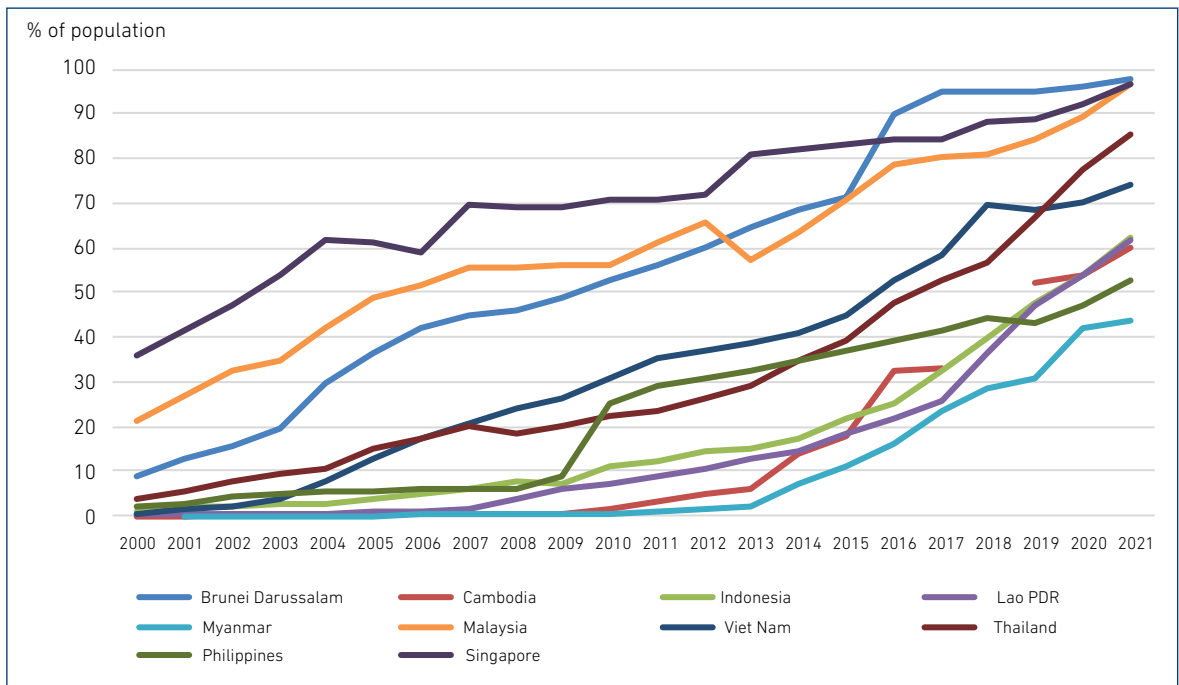
Source: Speedtest (n.d.), <https://www.speedtest.net/> (accessed 25 January 2024).

3.4. Digital Divide

Digital divides across firms and individuals, both within and between countries, are evident in the ASEAN region. Significant disparities exist in digital readiness amongst countries, governments, firms, and individuals, influenced by factors such as education, skills, and infrastructure. For instance, while Singapore boasts a mobile penetration rate of 170% in 2022, the Lao PDR faces challenges in improving digital literacy and uptake (Ministry of Communications and Information of Singapore, 2023). Figure 4 illustrates the internet uptake differences amongst AMS, with internet usage ranging from 40% in Myanmar to 98% in Brunei Darussalam and 96% in Singapore.

Digital uptake disparities are noticeable between AMS with robust digital infrastructure and capabilities and those with limited resources in these areas. Furthermore, within-country digital divides persist, particularly between rural and urban communities. Rural areas often encounter limited technology access, low digital adoption, and restricted internet availability. Disparities in digital skills development are also evident across AMS, as seen in the substantial difference between Singapore ranking 1st and Cambodia ranking 75th on the Inclusive Internet Index (EIU, 2022), highlighting significant digital inclusion gaps within the region.

Figure 4. Individuals Using the Internet in ASEAN Member States, 2000–2021



ASEAN = Association of Southeast Asian Nations.

Source: World Development Indicators (n.d.), <https://databank.worldbank.org/source/world-development-indicators> (accessed 25 January 2024).

These digital divides, characterised by inequalities in access to and utilisation of digital technologies, pose substantial obstacles to narrowing the gaps between regions, nations, and socio-economic strata. The ability to deploy technology effectively is crucial for digital transformation, but limited capabilities lead to unequal technology distribution. Technological advancements have resulted in increased market concentration and reduced competition, posing challenges for MSMEs and start-ups striving for competitiveness.

Moreover, at its core, digital divides underscore human capital disparities. The COVID-19 pandemic and technological disruptions have pushed marginalised workers in some AMS towards informal sector activities due to limited digital skills, while many professionals have transitioned to remote work as employers digitise processes (Intaratat, 2022). The evolving concept of the 'digital divide' now emphasises the skills gap between individuals with digital proficiency and those without. Possessing digital skills offers employment opportunities, income, and social outcomes, while their absence hampers prospects (OECD, 2016). The growing demand for advanced digital skills, juxtaposed with the existing proficiency levels within the ASEAN workforce, further highlights the urgency of addressing digital divides.

3.5. Environmental Sustainability

The rise of digital platforms and online trade has been lauded for its potential to reduce physical storefront consumption and waste generation, offering prospects for environmental sustainability. Telecommunications technologies are anticipated to contribute to carbon emissions reductions, thus promoting the long-term health of our environment. However, it is important to acknowledge that contemporary digital technologies still carry environmental costs. Fuchs (2006) highlighted a common misconception surrounding telework, suggesting that while it may reduce the need for physical travel and associated pollution, this effect is mitigated by the fact that teleworkers represent only a small fraction of the overall workforce. In fact, telework often fosters new social connections, leading to increased travel overall. While work-related travel accounts for a relatively small portion of total carbon dioxide emissions, the overall distance travelled per worker continues to rise.

As awareness of the environmental implications of digital technologies grows, it becomes increasingly important to develop a nuanced understanding of their environmental impact, both in the short and long term. AI and related digital technologies, despite their numerous benefits, carry significant environmental consequences. Notably, the energy consumption required for processing vast amounts of data, the extraction of minerals for manufacturing technological components, and the generation of electronic waste all contribute to carbon dioxide emissions (Samuel, Lucivero, and Somavilla, 2022). Therefore, it is essential not to underestimate the environmental costs associated with digital transformation. A comprehensive understanding of these challenges is imperative to guide responsible, ethical, and sustainable progress in digital technologies.

4. ASEAN Digital Community 2045

ASEAN faces a myriad of challenges on its digitalisation journey and requires a comprehensive long-term strategy to fully harness the potential of digital technology for the benefit of its Member States. Despite ongoing efforts to establish various frameworks for digital transformation, ASEAN's primary focus remains predominantly on the economic sector, particularly in digital trade. However, existing frameworks, while promising, lack a commitment to implementation and an evaluation mechanism, falling short of serving as a long-term vision for ASEAN.

Recognising both the extensive potential and simultaneous challenges linked to digitalisation, ASEAN must oversee comprehensive development across multiple domains beyond the economic sector, including security, political, and socio-cultural aspects. To effectively address these challenges and fully embrace digital transformation, ASEAN should prioritise developing a comprehensive framework that includes implementation commitment and an evaluation mechanism.

On the sidelines of the 42nd ASEAN Summit on 11 May 2023 in Labuan Bajo, Indonesia, ASEAN Leaders directed ASEAN experts to craft a robust and inspiring vision for the next 20 years. This decision followed the Leaders' inaugural engagement with the High-Level Task Force on ASEAN Community Post-2025 Vision. At this meeting, the Leaders urged the task force to create a visionary, inspiring, robust, comprehensive, inclusive, and forward-looking ASEAN Community Post-2025 Vision. Additionally, they stressed the need for an effective, efficient, balanced, inclusive, participatory, and coordinated drafting process, aiming to strike a balance between pragmatism and ambition, ensuring ASEAN's stability and progress while honouring its identity.

The ADC 2045 stands as a foundational framework to shape and propel ASEAN's digital economy agenda across all sectors. This framework will provide a sturdy base for a variety of initiatives aimed at fostering sustainable and inclusive growth within the ASEAN digital economy. The establishment of the ADC 2045 is motivated by two primary reasons. First, 2045 marks the 100th anniversary of Asian independence, both politically and economically, making it an opportune moment to renew ASEAN's commitment to achieving the goals outlined in its fundamental principles.² By doing so, ASEAN can navigate the evolving digital terrain, capitalising on opportunities while addressing associated challenges. Second, the advancement of digital technology lies at the core of the current global shift in the political and economic landscape, impacting not only economic aspects but also political security and socio-cultural aspects.

² TAMS have embraced the fundamental principles articulated in the 1976 Treaty of Amity and Cooperation in Southeast Asia, including (i) mutual respect for the independence, sovereignty, equality, territorial integrity, and national identity of all nations; (ii) the right of every state to lead its national existence free from external interference, subversion, or coercion; (iii) non-interference in the internal affairs of one another; (iv) settlement of differences or disputes by peaceful manner; (v) renunciation of the threat or use of force; and (vi) effective cooperation amongst themselves.

4.1. Three Pillars of the ASEAN Digital Community 2045

The ADC 2045 should cover the main three pillars of the ASEAN community.

4.1.1. ASEAN Digital Political-Security Community

The ASEAN Political-Security Community (APSC) is experiencing profound transformations due to the impact of digital technology on democratic politics and military advancements. The rapid evolution of technology has revolutionised elections, campaigning, and communication, offering new infrastructure for public engagement and broadening opportunities for participation. However, the potential challenges and implications of digitalisation in politics are yet to be fully understood and addressed. Concurrently, military technology has made remarkable strides, incorporating hybrid strategies that merge automation, cyber programmes, robotics, AI, and cyberwarfare. Innovations like digital healthcare automation, hypersonic missiles, the Internet of Military Things, and immersive technologies are reshaping the future of military operations. Developments such as border surveillance, security imaging, and joint military training in the metaverse underscore the increasing significance of digital technology in the APSC.

This digital transformation presents both opportunities and challenges to the APSC. On one hand, digital technology enhances the efficiency and effectiveness of democratic processes, such as elections and public engagement, fostering greater participation and transparency. On the other hand, it introduces new risks and threats, including cyberattacks, disinformation campaigns, and the misuse of technology for malicious purposes. To ensure the security and stability of the region, it is crucial for ASEAN to bolster its capacity in cybersecurity, intelligence gathering, and defence against emerging cyber threats. Additionally, cooperation and collaboration amongst AMS in sharing information, best practices, and developing joint strategies are essential to tackle the evolving challenges posed by digital technology in the APSC.

The establishment of the ADC 2045 can serve as a strategic framework to guide AMS in navigating the digital landscape and addressing these opportunities and challenges. Through concerted efforts and collective action, ASEAN can harness the transformative power of digital technology while mitigating its associated risks, ensuring a secure, prosperous, and resilient future for the region.

4.1.2. ASEAN Digital Economic Community

The AEC strives to unify ASEAN into a single market and production base, fostering competitiveness, equitable economic development, and seamless integration into the global economy. Projections suggest that by 2030, ASEAN's digital trade could soar to \$1 trillion (Google, Temasek, and Bain & Company, 2022). To capitalise on this potential and prevent any Member State from lagging, ASEAN must harness the power of digital technology to propel its transformation. Envisioning the ASEAN Digital Economic Community 2045 is essential for ensuring sustained prosperity, sustainable development, and inclusive growth in the age of AI and digitalisation.

By envisioning the ASEAN Digital Economic Community 2045, ASEAN will ensure a prosperous future for sustainable development and inclusive growth in the AI and digital eras. This initiative will enable ASEAN to capitalise on digital technology's potential to boost economic expansion, foster inclusivity, and bolster regional cohesion. Establishing the ASEAN Digital Economic Community 2045 will streamline the flow of digital goods, services, and investments amongst AMS, creating a dynamic digital economy. Moreover, it will promote collaboration amongst AMS to shape digital policies, regulations, and standards, facilitating the cohesive development of digital ecosystems across the region. This collective effort will enhance ASEAN's global competitiveness and resilience in the digital era, aligning with the objectives of the AEC to foster a highly competitive area with equitable economic development and full integration into the world economy.

4.1.3. ASEAN Digital Socio-Cultural Community

Digital technology has demonstrated its transformative power across various domains, notably in education and culture. Aimed at ensuring inclusive and equitable access to quality education, digital technology has emerged as an essential tool within educational systems, a trend that gained momentum during the COVID-19 pandemic. Moreover, it has facilitated skill development, cultural exchanges, and the incorporation of diverse perspectives.

The ASEAN Socio-Cultural Community was established to help ASEAN citizens reach their full potential. Embracing the advancement in digital technology is imperative for ASEAN to nurture the development of the ASEAN community in the 'socio-cultural' realms and prepare for the emergence of new digital cultures and values in the future.

By harnessing digital technology, ASEAN can elevate educational opportunities and cultural exchanges, ensuring universal access to high-quality learning resources and fostering a culture of lifelong learning. Additionally, digital platforms offer a means to preserve and promote diverse cultures, enabling AMS to showcase their heritage and traditions on a global platform. Moreover, ASEAN has the potential to foster greater connectivity and collaboration amongst AMS. Through digital platforms, there is an opportunity for the exchange of ideas, knowledge, and experiences across various socio-cultural domains. This collaborative effort can pave the way for innovative solutions to common challenges such as poverty alleviation, social inclusion, and environmental conservation.

4.2. Five Elements Across the Three Pillars of the ASEAN Digital Community 2045

The ADC 2045 should encompass at least five key elements across its three pillars (political-security, economic, and socio-cultural):

4.2.1. Data Governance

It is imperative for ASEAN to undertake regulatory transformation to address its outdated policies and regulatory frameworks. The modernisation of ASEAN policies and regulations is essential to keep pace with the rapidly evolving digital era faced by the region. While ASEAN has made progress in regulating the digital economy in recent years, significant work remains to be done to regulate the ASEAN digital ecosystem effectively. Despite the emergence of noteworthy digital frameworks in ASEAN, such as the ASEAN Digital Data Governance Framework, the BSBR, and the ASEAN Digital Integration Framework, additional efforts are required to regulate the digital landscape in a comprehensive manner.

ASEAN must prioritise dedicated efforts to enhance digital governance by establishing unified and standardised regulations pertaining to competition, data privacy, cybersecurity, patents, and copyrights across all AMS.

4.2.2. Digital Productivity

The optimal utilisation of digital technology should aim to enhance value-added, revolutionise business models, and support development across all sectors. While considerable progress has been made in digital transformation within the finance, trade, and investment domains, ASEAN now faces the challenge of extending this success to all sectors of the economy. For example, the adoption of digital technologies in the healthcare and energy sectors has the potential to reduce costs, optimise operations, and improve the quality and accessibility of services. Digital health encompasses various technologies, including mobile health apps, connected wearable devices, and telemedicine, with the digital health market projected to reach \$6.66 billion by 2023 (Statista, 2022a). ASEAN's embrace of digital transformation across diverse sectors is expected to yield significant benefits through increased value-added, innovation, and economic growth in the region's digital economy.

4.2.3. Digital Connectivity

It is crucial to establish robust digital and physical infrastructure to unlock ASEAN's full economic potential. The development of strong physical and digital infrastructure is vital for ensuring connectivity. Physical infrastructure includes the construction of reliable roads, ports, railways, airports, power plants, and logistics hubs. Digital infrastructure encompasses the development of broadband access, hardware, software, data centres, and modern networks. By integrating digital payment systems and implementing modern digital technologies across governments and businesses in their production and service processes, ASEAN can facilitate seamless trade in goods and services throughout the region.

4.2.4. Digital Inclusivity

Reflecting on the accelerating pace of the digital era, it becomes evident that at its core, this digital transformation revolves around people. Amid the technological advancements and digital innovations, it is crucial to ensure that no one is left behind. The main imperative is to bridge the digital divide, increase the involvement of MSMEs, and reduce regional sectoral disparities, as digital technology holds the potential to improve productivity, promote trade, and create jobs in ASEAN. Digital inclusion is pivotal in empowering economic players such as MSMEs to access financial services, expand operations, and partake in global digital transformation. By prioritising these efforts and initiatives, ASEAN can advance toward equitable growth and foster an inclusive digital economy.

4.2.5. Digital Sustainability

Digital technology has been extensively embraced across a broad spectrum of economic activities, necessitating an acknowledgement of the sustainability challenges in the region. The scope of digital transformation should encompass an understanding of the impact of digital technology on environmental sustainability. The prevailing mode of digital transformation often has adverse environmental effects, manifesting in unsustainable practices. Looking ahead, ASEAN should concentrate on promoting environmentally friendly usage of digital products, services, and centres. The initial steps towards sustainable digital transformation for the ASEAN community could involve the development of regional initiatives, establishment of regional standards, and provision of training on green digital transformation and the circular economy.

Recognising the intricate interplay between digitalisation and its foundational three pillars, ASEAN has opportunities to leverage the potential of digital technology. This potential can be channelled to drive economic growth, elevate social well-being, and strengthen regional integration. Such an endeavour demands strategic investments and resource allocation, resilient regulatory frameworks, and collaborative efforts. The envisioned realisation of the ADC 2045 aims to empower the region in mounting more adept responses to global economic disruptions and uncertainties. Moreover, this initiative stands to position ASEAN as one of the key players in the global digital economy, aiming to realise sustainable development with no one left behind.

5. Follow-Up Actions

The ADC 2045 serves as a long-term vision for ASEAN to advance the development of the region's digital landscape, aligning with the three pillars of ASEAN. Endorsed by AMS in the ASEAN Leaders' Declaration on ASEAN as an Epicentrum of Growth during the 43rd ASEAN Summit on 5 September 2023, the ADC 2045 underscores the importance of a steadfast commitment to a long-term digital vision for optimising the use of digital technologies, ensuring sustainable and inclusive growth for the entire region.

To realise this vision, ASEAN must undertake follow-up actions to establish a thriving and comprehensive digital community by 2045.

- (i) **Formulating a feasible action plan:** ASEAN must embark on a strategic and concerted path forward by developing a comprehensive action plan with clear targets. This plan should be complemented by individual national plans aligned with regional goals and accompanied by annual targets to track progress effectively.
- (ii) **Robust review and evaluation process:** Completion of both national and regional action plans should be accompanied by a robust review and evaluation process to assess policy effectiveness and implementation. Mobilising resources for physical and digital connectivity projects is crucial to ensuring seamless interconnectedness within the region.
- (iii) **Prioritising human capital development:** Governments across ASEAN should prioritise upscaling programmes to develop human capital at both the regional and national levels. This involves enhancing workers' skill sets through vocational training, integrating digitalisation into the education curriculum, supporting entrepreneurs to foster innovation, and raising awareness of sustainable digital practices.

Moreover, transparent coordination amongst AMS, complemented by the formation of a task force, is imperative to ensure clear measures, indicators, and traceability of each AMS's digital economy status, advancing its digital development agenda. The envisioned realisation of the ADC 2045 aims to empower the region in mounting more adept responses to global economic disruptions and uncertainties while positioning ASEAN as a key player in the global digital economy, striving to achieve sustainable development with a commitment to leaving no one behind.

Appendix 1: Competition Laws in ASEAN

Competition laws are integral to creating a level playing field for all enterprises and business players, particularly small and medium-sized enterprises (SMEs). These laws aim to promote fair market practices, foster innovation, and ensure consumer protection. As part of ongoing efforts, the Association of Southeast Asian Nations (ASEAN) formulated the ASEAN Economic Community (AEC) Blueprint 2025, which includes a segment on competition policy, with the goal of establishing a well-functioning market through effective competition policy. The strategic measures outlined in the AEC Blueprint 2025 for effective competition policy encompass various aspects. These include establishing effective competition laws in all AMS, enhancing the capabilities of competition-related agencies, promoting a 'competition-aware' region, and creating regional cooperation agreements focused on competition policy and law.

Additionally, the AEC Blueprint 2025 emphasises the importance of increased harmonisation of competition law and policy in ASEAN through the formulation of a regional strategy on convergence. It also stresses the need to ensure that competition policies negotiated by ASEAN through different free trade agreements with Dialogue Partners and other trading partners are consistent with the competition policy and laws in the region. Moreover, continuous efforts are being made to improve competition policy and law in ASEAN, while adopting global best practices.

In line with the AEC Blueprint 2025, ASEAN formulated the ASEAN Competition Action Plan, 2016–2025, which builds upon initiatives set under the AEC Blueprint 2015. The action plan aims to establish robust competition regimes within all AMS, bolster the capacities of competition-related agencies, emphasise regional cooperation arrangements on competition policy and law, foster a competition-aware ASEAN, and drive greater harmonisation of competition law across AMS.

However, despite these efforts, rapid digitalisation in recent years has presented new challenges that many AMS must address. While several AMS have enacted competition laws, these laws have yet to fully incorporate digitalisation aspects. Efforts to integrate digitalisation into competition laws exist, but they often lack cohesion and comprehensive categorisation. For example, while Indonesia's Law No. 5 concerning the Prohibition of Monopolistic Practices and Unfair Business Competition does not explicitly include digitalisation aspects, certain provisions in related regulations address competition concerns in e-commerce and e-advertisement. Similarly, the Lao People's Democratic Republic's competition laws do not incorporate digitalisation, but certain provisions in its Electronic Transaction Law address competition issues related to the protection of personal information in digital transactions.

In summary, while ASEAN has made strides in formulating competition policies and laws, there is a pressing need to adapt to the challenges posed by digitalisation and ensure that competition frameworks effectively address digital market dynamics across the region.

Appendix 2: Privacy Laws in ASEAN

The current regulatory landscape in the Association of Southeast Asian Nations (ASEAN) Member States exhibits significant disparities in data protection, e-commerce, privacy laws, and cybersecurity. Privacy emerges as a key challenge hindering integrated ASEAN digital transformation. The absence of integrated privacy laws across ASEAN may lead to potential data misuse, jeopardising secure and seamless cross-border data flows. Recognising the imperative to foster digital trade and transactions within ASEAN, efforts are underway to address the need for robust privacy laws, particularly in the digital realm, to support the region's digital economic growth and safeguard individual privacy rights. ASEAN has laid the groundwork for its privacy framework through two pivotal frameworks: the ASEAN Framework on Personal Data Protection in 2016 and the ASEAN Digital Data Governance Framework in 2018. These frameworks delineate principles for data protection, transparency, data use, and data control.

The ASEAN Framework on Personal Data Protection 2016 endeavours to promote responsible use and protection of personal data within the region. It aims to harmonise personal data protection across Member States while fostering consistency and interoperability in data processing practices. Encompassing key principles such as consent, notification, and purpose; accuracy of personal data; security safeguards; access and correction; transfers to another country or territory; retention; and accountability, this framework serves as a foundation for developing national-level privacy frameworks and regulations on privacy and personal data. Despite being non-binding, it provides a guiding framework for Member States to align their privacy-related frameworks and regulations. In parallel, the ASEAN Digital Data Governance Framework developed in 2018 discusses strategic priorities concerning data integrity, control, and security related to cross-border data flows within the region. Emphasising regulations and the significance of sharing best practices in data governance across ASEAN Member States (AMS), this framework underscores the importance of cohesive approaches to data management and protection.

However, challenges persist as AMS strives for harmonisation across privacy laws. While some countries like the Lao People's Democratic Republic, Indonesia, Malaysia, the Philippines, Singapore, and Thailand have enacted comprehensive privacy laws, others are still in the nascent stages. For instance, Indonesia passed its Law of Personal Data Protection in 2022, set to come into force in October 2024, while Malaysia and Singapore have had data protection laws since 2010 and 2012, respectively. On the other hand, countries like Brunei Darussalam, Cambodia, Myanmar, and Viet Nam have privacy laws in development but lack comprehensive regulations. This variance in privacy regulations poses challenges, leading to discrepancies in the scope and enforcement of privacy laws at the national level.

The disparities in privacy regulations within ASEAN pose multifaceted implications, particularly in terms of business operations, cross-border data flows, protection of personal information, cybersecurity, regulatory compliance, and accountability. To address these implications effectively, ASEAN must foster a culture of privacy and cybersecurity awareness, promote collaboration and sharing of best practices amongst AMS, and explore the establishment of a regional data protection authority or centralised oversight mechanism. By undertaking these measures, ASEAN can create a conducive environment for businesses to thrive while upholding individuals' privacy rights in the rapidly evolving digital landscape.

Appendix 3: Taxing the Digital Economy

The burgeoning growth of the digital economy, especially in the realm of digital trade within the Association of Southeast Asian Nations (ASEAN) region, has presented formidable challenges to traditional tax systems (Mullins, 2022). This realm of the economy encompasses the delivery of goods and services online and across borders. The once-distinct boundaries between trade and taxation have become blurred, posing challenges that remain inadequately understood (Moshkova, 2021). At the onset of 2020, Singapore and Malaysia led Southeast Asia by introducing taxes of 7% and 6%, respectively, on imported digital services. Indonesia followed suit in May 2020 by imposing a 10% value-added tax on non-resident companies offering digital services (Elms and Agnew, 2022).

As a response to the significant growth in digital retailers' revenue, the European Union has begun implementing tax policies aimed at the digital economy. The revenue of the entire retail sector in the European Union grew by 1% between 2008 and 2016, while the revenue of the top 5 e-retailers grew by 32% in the same period (Jakurti, 2017). Taxing the digital economy would narrow the gap in tax rates between digital companies and traditional brick-and-mortar companies. The OECD/G20 Inclusive Framework on Base Erosion and Profit Shifting (BEPS) has garnered consensus from over 135 countries on a Two-Pillar Solution for international taxation reform, aimed at reallocating taxing rights and profits amongst multinational corporations, including digital entities (OECD, n.d.).

However, the taxation of digital players poses significant challenges to governments worldwide. The highly digitalised nature of these businesses, coupled with their lack of physical presence and manipulation of intangible assets for profit, complicates taxation efforts (Dabla-Norris et al., 2021). Using digital services, protecting private information, and incorporating digital technologies in tax design exacerbates these challenges (OECD, 2014).

In response to these complexities, countries have adopted various approaches to taxing the digital economy, such as digital services taxes and revisions to existing tax rules (Moshkova, 2021). International cooperation is recognised as essential in developing a unified approach to taxing the digital economy, with organisations like the OECD playing a crucial role in establishing a global consensus on profit allocation and taxing rights (OECD, n.d.).

The ongoing dialogue and collaboration amongst governments, organisations, and stakeholders are vital in navigating the intricate landscape of taxing the digital economy. Innovation and cooperation are imperative to address the evolving challenges posed by the digital economy effectively (Hanna, 2020).

In conclusion, addressing the taxation of the digital economy requires a forward-thinking and collaborative approach that embraces innovation and international cooperation. By engaging in ongoing dialogue and consensus-building on tax principles, stakeholders can lay the groundwork for a robust and equitable tax framework that fosters innovation and supports global economic growth.

References

- ADB (2022), *Asian Economic Integration Report 2022: Advancing Digital Services Trade in Asia and the Pacific*, Manila: Asian Development Bank.
- ASEAN (2015), 'ASEAN Economic Community Blueprint 2025', Jakarta: ASEAN Secretariat.
- (2016a), 'ASEAN Competition Action Plan 2025', Jakarta: ASEAN Secretariat.
- (2016b), 'Framework on Personal Data Protection', Jakarta: ASEAN Secretariat.
- (2018), 'Framework on Digital Data Governance', Jakarta: ASEAN Secretariat.
- (2019), 'ASEAN Digital Integration Framework Action Plan (DIFAP) 2019–2025', Jakarta: ASEAN Secretariat.
- (2020a), *ASEAN Comprehensive Recovery Framework*. Jakarta: ASEAN Secretariat.
- (2020b), *ASEAN Comprehensive Recovery Framework: Implementation Plan*, Jakarta: ASEAN Secretariat.
- (2021a), *ASEAN Data Management Framework: Data Governance and Protection Throughout the Data Lifecycle*, Jakarta: ASEAN Secretariat.
- (2021b), *ASEAN Digital Masterplan 2025*, Jakarta: ASEAN Secretariat.
- (2021c), 'The Bandar Seri Begawan Roadmap: An ASEAN Digital Transformation Agenda to Accelerate ASEAN's Economic Recovery and Digital Economy Integration', Jakarta: ASEAN Secretariat.
- (2021d), 'Work Plan on the Implementation of ASEAN Agreement on Electronic Commerce', Jakarta: ASEAN Secretariat.
- (2023), 'Boracay Digital Declaration'. <https://asean.org/wp-content/uploads/2023/02/Boracay-Aklan-Digital-Declaration-ADOPTED-1.pdf>
- Dabla-Norris, E. et al. (2021), 'Digitalization and Taxation in Asia', *Asia-Pacific–Fiscal Affairs Departmental Paper*, No. DP/2021/017, Washington, DC: International Monetary Fund.
- EIU (2022), The Inclusive Internet Index. <https://impact.economist.com/projects/inclusive-internet-index/>
- Elms, D. and N. Agnew (2022), 'Digital Trade in Asia', *RSC Working Paper*, No. 2022/51, Robert Schuman Center for Advanced Studies, Florence: European University Institute.
- Fuchs, C. (2006), 'The Implications of New Information and Communication Technologies for Sustainability', *Environment, Development and Sustainability*, 10, pp.291–309.
- Google, Temasek, and Bain and Company (2022), *e-Economy SEA 2022: Through the Waves, Towards a Sea of Opportunity*. <https://www.bain.com/insights/e-economy-sea-2022/>

- Ha, H. and C.K.P. Chuah (2023), 'Digital Economy in Southeast Asia: Challenges, Opportunities and Future Development', *Southeast Asia: A Multidisciplinary Journal*, 23(1), pp.19–35.
- Hanna, N.K. (2020), 'Assessing the Digital Economy: Aims, Frameworks, Pilots, Results, and Lessons', *Journal of Innovation and Entrepreneurship*, 9(1), 16.
- Huawei and Oxford Economics (2017), 'Digital Spillover: Measuring the True Impact of the Digital Economy'. https://www.huawei.com/minisite/gci/en/digital-spillover/files/gci_digital_spillover.pdf
- Infrastructure Asia (n.d.), The Catalytic Role of Digital Connectivity. <https://www.infrastructureasia.org/Insights/The-catalytic-role-of-digital-connectivity>
- Ing, L.Y., G. Grossman, and D. Christian (2022), 'Digital Transformation: "Development for All"?', in L.Y. Ing and D. Rodrik (eds.) *New Normal, New Technology, New Financing*, Jakarta: ERIA and IEA, pp.76–88.
- Ing, L.Y. and I. Markus (2023), 'ASEAN Digital Community 2040', *Policy Brief*, No. 2022-11, Jakarta: Economic Research Institute for ASEAN and East Asia (ERIA).
- Intaratat, K. (2022), 'Digital Literacy and Digital Skills Scenario of ASEAN Marginal Workers Under and Post COVID-19 Pandemic', *Open Journal of Business and Management*, 10(1), pp.118–33.
- Jakurti, E. (2017), 'Taxing the Digital Economy – It's Complicated', Brookings, Commentary, 13 December. <https://www.brookings.edu/articles/taxing-the-digital-economy-its-complicated/>
- Kolbanev, M.O., I.I. Palkin, and T.M. Tatarnikova (2020), 'The Challenges of the Digital Economy', *Hydrometeorology and Ecology* (Proceedings of the Russian State Hydro-meteorological University), 58, pp.156–67 (in Russian).
- Lazović, V. and T. Duričković (2014), 'The Digital Economy in Developing Countries – Challenges and Opportunities' in P. Biljanovic et al. (eds.) 2014 37th *International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO)*, Opatija, Croatia: Croatian Society for Information and Communication Technology, Electronics and Microelectronics (MIPRO), pp.1580–85.
- Ministry of Communications and Information of Singapore (2023), 'Singapore's Digital Connectivity Blueprint'. <https://www.imda.gov.sg/-/media/imda/files/programme/digital-connectivity-blueprint/digital-connectivity-blueprint-report.pdf>
- Moshkova, D.M. (2021), 'Digitalisation of Tax Administration in the Context of the Development of High-Tech Municipalities', in *IOP Conference Series: Earth and Environmental Science*, 740, 012024.
- Mullins, P. (2022), 'Taxing Developing Asia's Digital Economy', Background Paper, *Asian Development Outlook 2022: Mobilizing Taxes for Development*, Manila: Asian Development Bank.
- Nielsen, M.M., I.K. Rohman, and N.V. Lopes (2018), 'Empirical Analysis of the Current Digital Divides Since 2010', in A. Kankanhalli, A. Ojo, and D. Soares (eds.) *ICEGOV '18: Proceedings of the 11th International Conference on Theory and Practice of Electronic Governance*, New York: Association for Computing Machinery, pp.616–25.

- OECD (n.d.), 'Action 1 Tax Challenges Arising from Digitalisation', <https://www.oecd.org/en/topics/policy-issues/base-erosion-and-profit-shifting-beps.html#beps-actions>
- (2014), *Addressing the Tax Challenges of the Digital Economy*, OECD/G20 Base Erosion and Profit Shifting Project, Paris: Organisation for Economic Co-operation and Development.
- (2016), *Innovating Education and Educating for Innovation: The Power of Digital Technologies and Skills*, Paris: Organisation for Economic Co-operation and Development.
- Oppitz, M. and P. Tomsu (2018), 'Security and Privacy Challenges' in *Inventing the Cloud Century: How Cloudiness Keeps Changing Our Life, Economy and Technology*, Cham, Switzerland: Springer, pp.377–410.
- Samuel, G., F. Lucivero, and L. Somavilla (2022), 'The Environmental Sustainability of Digital Technologies: Stakeholder Practices and Perspectives', *Sustainability*, 14(7), 3791.
- Sapulette, M.S. and P.A. Muchtar (2023), 'Redefining Indonesia's Digital Economy', *Policy Brief*, No. PB-2022-06, Jakarta: Economic Research Institute for ASEAN and East Asia (ERIA).
- SIIA (2022), 'Charting ASEAN's Digital Future: Emerging Policy Challenges', Singapore: Singapore Institute of International Affairs.
- Statista (2022a), 'Digital Health: Market Data Analysis and Forecast'. <https://www.statista.com/study/116507/digital-health-report-2022/#:~:text=The%20Digital%20Health%20market%20consists,US%24256.3%20billion%20by%202027>
- (2022b), Retail E-Commerce Sales Worldwide from 2014 to 2026. <https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/> (accessed 26 May 2023).
- (2023), Digital Payments – Southeast Asia. <https://www.statista.com/outlook/dmo/fintech/digital-payments/southeast-asia> (accessed 6 July 2023).
- Suvannaphakdy, S. (2022), 'Better Safeguards Needed for Trusted Data Use in ASEAN Countries', ISEAS – Yusof Ishak Institute. <https://www.iseas.edu.sg/articles-commentaries/iseas-perspective/2022-67-better-safeguards-needed-for-trusted-data-use-in-asean-countries-by-sithanonxay-suvannaphakdy/>
- UNCTAD (2022), 'Digital Trade: Opportunities and Actions for Developing Countries', *Policy Brief*, No. 92. Geneva: United Nations Conference on Trade and Development.
- UNESCAP and ASEAN (2021), 'Digital and Sustainable Trade Facilitation in the Association of Southeast Asian Nations (ASEAN) 2021'. https://asean.org/wp-content/uploads/2022/01/ASEAN-report-2021-FINAL_Low-res.pdf
- World Economic Forum (2021), 'ASEAN Digital Generation Report: Pathway to ASEAN's Inclusive Digital Transformation and Recovery'. https://www3.weforum.org/docs/WEF_ASEAN_Digital_Generation_2021.pdf
- WTO (2023), 'Global Trade Outlook and Statistics'. https://www.wto.org/english/res_e/booksp_e/trade_outlook23_e.pdf