

Chapter 3

ASEAN Digital Community 2045

Lili Yan Ing, Yessi Vadila, Ivana Markus and
Livia Nazara

This chapter should be cited as
Ing, L.Y., Y. Vadila, I. Markus and L. Nazara (2025), 'ASEAN Digital Community
2045', in Rillo, A.D and B. Shepherd (eds.), *Where Next? Priorities for the ASEAN
Economic Community Post-2025*. Jakarta, Indonesia: Economic Research Institute
for ASEAN and East Asia, pp. 27-52.

3.

ASEAN Digital Community 2045

Lili Yan Ing, Yessi Vadila, Ivana Markus, and Livia Nazara

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). Digital transformation is defined as a profound transformation of business activities, organisations, processes, competencies, and models to fully leverage the changes and opportunities of a mix of digital technologies and their accelerating impact across society in a strategic and prioritised way (Benavides et al., 2020). At its core, it is driven by the tangible shift in the role of technology within an organisation, where technology is no longer seen as a support function but can enable driver and new innovative business models (Tang, 2021).

Digital transformation triggers a shift towards more digitally deliverable services, which in turn stimulates digital trade by enabling services and goods to be traded via digital platforms and networks. Notably, the services sector has experienced a significant rise in digitalisation, especially during the coronavirus disease (COVID-19) pandemic when there were limited socio-economic activities and less mobility. Trade in digitally deliverable services demonstrated relative resilience during this period. In Asia, the value of digitally deliverable services trade increased from \$120.8 billion¹ in 2005 to \$483.5 billion in 2019 (ADB, 2022). Trade in digitally deliverable services could be defined as those that can be delivered over information and communications technology (ICT) networks, including ICT services, sales and marketing services, financial services, professional services, and education and training services, amongst others (OECD, 2023).

¹ In this chapter, \$ refers to US dollars.

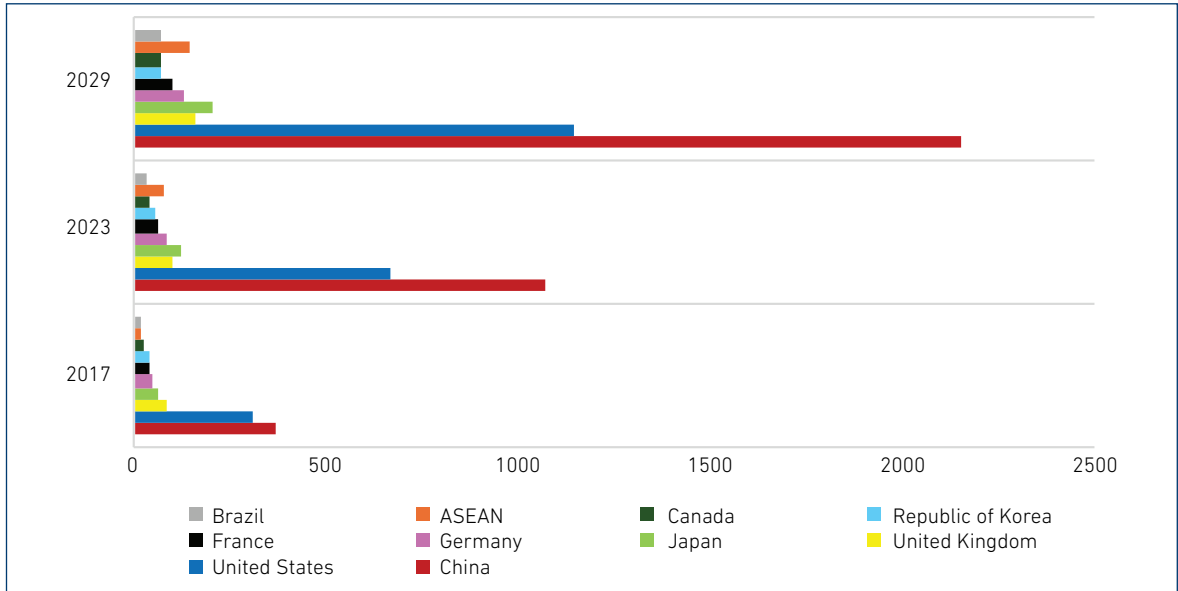
Whilst there is no single recognised definition of digital trade, it is defined by OECD as transactions in the trade of goods and services that are facilitated through digital means (López González and Jouanjean, 2017). Meanwhile, e-commerce, an abbreviation for electronic commerce, is defined as the process of buying or selling goods or services over computer networks, employing methods specifically devised for the purpose of placing or receiving orders (OECD, 2019). The global revenue in the e-commerce market reached \$5.78 trillion in 2023 and is anticipated to rise to \$6.33 trillion in 2024 and \$8.03 trillion by 2027 (Statista, 2024). As illustrated in Figure 3.1, ASEAN holds a significant portion of the world's e-commerce, generating revenues of \$78.6 billion in 2023. It is projected to exhibit an annual growth rate (compound annual growth rate 2024–2029) of 10.17%, leading to an estimated market volume of \$143.70 billion by 2029. ASEAN has ascended from the ninth position in 2017 to fifth in 2023 and is expected to surpass Germany to claim the fourth spot by 2029 (Statista, 2024).

ASEAN has an immense opportunity to grow its digital landscape further and develop its central role in the era of digital transformation. One of the key factors behind ASEAN expanding digital trade is its young, digital-savvy population. In 2022, internet users in ASEAN reached 460 million, up from 360 million in 2019 (Figure 3.2) – an increase of 100 million users in just 3 years of digital transformation (Baijal, et al., 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, whilst more than 40% placed orders online (UNCTAD, 2022).

The other key success factor in ASEAN digital trade lies in the growth and effectiveness of digital payments. ASEAN stands out as the world's fastest-growing mobile wallet market (Lee, 2021). The rise of cross-border trade over the past decade has played a significant role in the increased utilisation of digital payments. Traditionally, cross-border trade has been associated with long processing times and high costs. Digital payments offer a solution to these challenges by providing users with convenience and efficiency. In ASEAN, the total transaction value of digital payments is projected to reach \$226.6 billion in 2023, with the largest market being digital commerce, estimated to have total transactions of \$193.8 billion (Statista, 2023).

Despite the immense potential, ASEAN grapples with challenges in digitalisation, ranging from infrastructure limitations to socio-cultural barriers, underscoring the need for concerted efforts to harness the full potential of digitalisation. Section 2 presents key challenges in digital transformation. Section 3 explains the existing ASEAN frameworks on digital issues from 2016–2023. Section 4 underscores the imperative for ASEAN to chart a long-term vision for embracing the digital potential, ensuring comprehensive development across economic, security, political, and socio-cultural dimensions. Section 5 outlines follow-up actions.

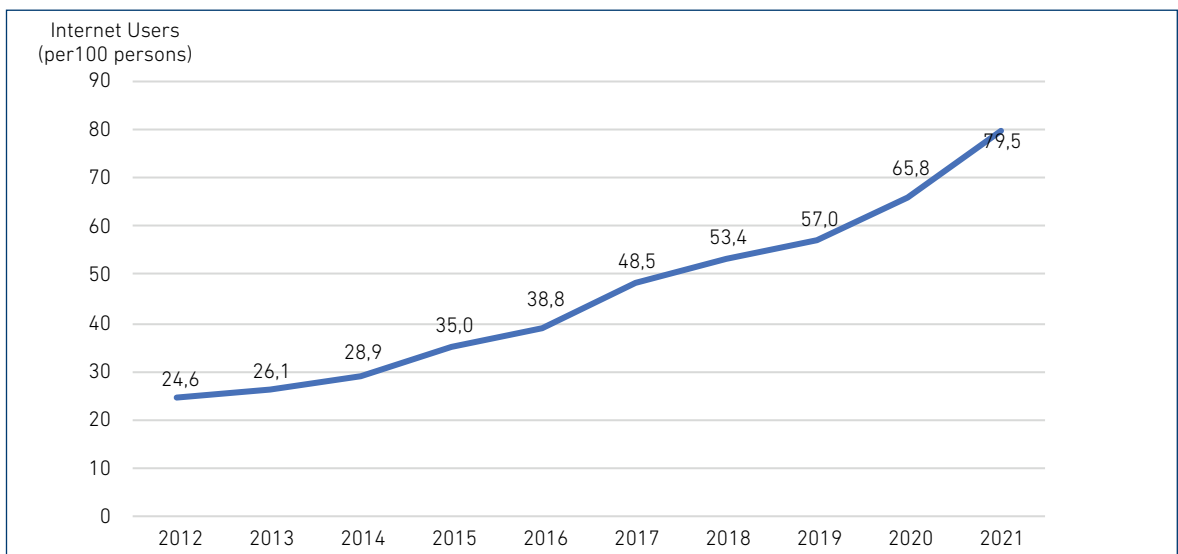
Figure 3.1. Top Ten Contributors to the E-Commerce Global Revenue (\$ billion)



\$ = US dollars, ASEAN = Association of Southeast Asian Nations.

Source: Authors calculation based on Statista (2022b) (updated on 1 March 2024).

Figure 3.2. Access to Internet Services in ASEAN, 2012–2021



Note: 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 the Republic of the Union of 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).

2. Key Challenges in ASEAN Digital Transformation

2.1. Data, Cybersecurity, and Competition

Data and information from private individuals and institutions are exposed to service providers and the pervasive exchange of data has fuelled concerns about its use and misuse. The swift accumulation of digital data and the establishment of a global information infrastructures within the digital economy give rise to concerns about the privacy of data and the safeguarding of personal information (Kolbanev, Palkin, and Tatarnikova, 2020). The widespread proliferation of personal computers and the accessibility of international networks have caused a surge in security risks and breaches, underscoring the necessity for robust cybersecurity measures (Oppitz and Tomsu, 2018).

The expansion of rapid digitalisation and the use of data comes with increased threats against data, systems, and people. At the same time, technological advances enable firms to produce and operate in large economies of scale that build market concentration. Such market concentration reduces competition and can be a barrier to micro, small, and medium-sized enterprises (MSMEs) and start-ups enjoying a level playing field, as big tech players tend to use integration as a strategy to dominate markets and capture more revenue, at the cost of MSMEs and consumers. The convergence of competition law with the safeguarding of privacy in the realm of big data and social media presents a significant hurdle for competition authorities worldwide (Nielsen, Rohman, and Lopes, 2018).

In the case of ASEAN, the existing regulatory policies and frameworks may not adequately address emerging digital concerns such as data protection and cybersecurity (SIIA, 2022). These policies were not specifically designed to keep up with rapid advancements in the digital landscape, which could hinder the progress of ASEAN's digital economy. Moreover, varying levels of digital maturity and diverse regulatory frameworks across ASEAN Member States (AMS) create complexities in standardising regulations within the region. ASEAN's digital economy exhibits noticeable regulatory gaps and inconsistencies, encompassing areas such as competition, data privacy, cybersecurity, patents, and copyright laws across all AMS.

The widespread sharing of private information with service providers has raised numerous concerns regarding the use and misuse of data, whereas ASEAN data protection regulations exhibit disparities in their development.

ASEAN has demonstrated an increasing commitment to developing best practices for data governance in the region. The ASEAN Framework on Digital Data Governance (ASEAN, 2018) outlined strategic priorities for ASEAN, including facilitating cross-border data flows. However, the adoption of regional data governance still exhibits disparities amongst AMS and is in the early stages. Whilst countries such as Singapore and Thailand do not have data localisation policies, others such as Indonesia and Viet Nam still require data to be stored locally (SIIA, 2022).

Furthermore, countries such as Malaysia, the Philippines, Singapore, and Thailand have made notable strides to enact data protection laws, though these laws are dispersed across a variety of legislation and regulations, with certain nations having dedicated data protection statutes. Similar dynamics extend to the realm of cybersecurity, where certain AMS lag in implementing the regulations. Viet Nam stands out amongst these countries for its cybersecurity laws, mandating private companies operating within its borders to house data on local servers to ensure heightened security (Suvannaphakdy, 2022). Discrepancies in data protection laws and enforcement mechanisms can raise concerns about data breaches, unauthorised access, and misuse of personal information. Differences in data privacy laws, e-commerce regulations, intellectual property rights, and cybersecurity standards can hinder cross-border digital trade and investment.

2.2. Productivity

ASEAN countries exhibit different levels of development, with Singapore as the front runner in all economic, social, and human development indicators, compared with the Lao People's Democratic Republic and the Republic of the Union of Myanmar. The diversity of ASEAN's level of economic development and digitalisation has resulted in diverse progress in digitalisation and technology ecosystems in the region. According to the ASEAN Digital Generation Report by the World Economic Forum (WEF, 2021), productivity improvement is one of the greatest benefits of digital enhancement in the economy. The report reveals that MSME owners have found digitalisation to aid them in timesaving and automation, providing convenient access to information, expanding the availability of goods and services, and bolstering their capacity to generate additional income. These factors collectively contribute to enhancing business efficiency and optimisation for MSMEs. The digitalisation of production processes is expected to drive businesses to allocate tasks more efficiently, resulting in productivity gains. A study by the International Monetary Fund (Dabla-Norris et al., 2023) indicated that in Asia's developing countries, process innovation has a more pronounced impact on productivity than product innovation. However, the varying levels of economic development and digitalisation in ASEAN have led to uneven progress in digitalisation and technology ecosystems. Disparities in the adoption of digital technology across various levels of economic development are likely to further widen productivity gaps amongst AMS.

Moreover, working together as a region, ASEAN's primary digitalisation focus remains on the development of digital trade, digital platforms, and e-commerce. The United Nations Economic and Social Commission for Asia and the Pacific and ASEAN (UNESCAP and ASEAN, 2021) emphasised the critical role of reducing trade costs to facilitate robust engagement in global and regional value chains, ensuring that trade continues to serve as a fundamental driver of sustainable growth. Despite notable growth in the trade, finance, and investment sectors through digitalisation, the need remains urgent to broaden the scope of digital transformation to encompass other sectors. The concentrated focus on digital trade, platforms, and e-commerce has resulted in limited progress in expanding value-added beyond these domains, thereby impeding the comprehensive advancement of ASEAN's digital economy.

2.3. Connectivity

In recent years, ASEAN has made remarkable progress in bolstering its digital infrastructure to support the growth of its digital economy. A pivotal challenge in ASEAN's digital transformation lies in the deficiency of both digital and physical enablers, encompassing digital infrastructure and connectivity. The establishment of a robust digital infrastructure and seamless connectivity is imperative for advancing the digital economy within ASEAN. This encompasses cutting-edge networks, hardware, software, data centres, and widespread broadband connectivity to facilitate the seamless provision of digital services. Infrastructure Asia underscores the significance of prioritising digital connectivity, encompassing factors such as accessibility, bandwidth requirements, affordability of data connections, and device availability, to fortify the digital infrastructure across ASEAN (Infrastructure Asia, n.d.).

Nevertheless, digitalised systems and digitally deliverable goods and services still constitute a smaller proportion in lower-income countries compared with other global regions. The capability to deploy technology emerges as a pivotal concern in digital transformation, evident in the unequal distribution of technologies due to limited capacities. An examination of the primary indicators contributing to the digital divide – internet speed, usage, and technology production – reveals a significant disparity amongst AMS. For instance, Indonesia's internet speed is 21.95 megabits per second (Mbps), Singapore's is 211.36 Mbps, and the Republic of the Union of Myanmar lags at 18.35 Mbps (Ing and Markus, 2023). In this digital epoch, the synergy of digital and physical connectivity is the linchpin for successful digital transformation, resonating within the ASEAN region.

Digitalisation has the potential to elevate productivity and invigorate MSMEs through digitalising the payment system and the growth of online selling platforms (WEF, 2021). It helps MSMEs and women to engage more in the workforce through their small businesses. Moreover, digital lending or financing is also positively impacting the growth of MSMEs. However, the disparate progress in digital advancement amongst and within AMS could impede the positive impacts on productivity and various economic sectors within ASEAN. For instance, the scarcity of robust digital infrastructure deters AMS from adopting digital technologies across diverse value-added sectors. In addition, the Logistics Performance Index score of AMS could be significantly improved through the widespread adoption of digital technologies in the region (Ha and Chuah, 2023).

2.4. Digital Divide

Digital divides affect firms and individuals across and within countries in this region. Countries, governments, firms, and individuals vary greatly in their digital readiness, which is influenced by factors such as education, skill levels and available infrastructure. Differences in digital uptake emerge between AMS with robust digital infrastructure and capabilities, and those with limited resources in these areas. Moreover, within-country digital divides manifest as gaps between rural and urban communities, with rural areas facing restricted access to technology, low digital adoption, and limited internet availability. Digital skill development varies significantly across AMS, exemplified by Singapore that ranks first and Cambodia that ranks 75th on the Inclusive Internet Index (EIU, 2022), underscoring a substantial digital inclusion gap within the region. Similar disparities persist within individual countries, particularly between urban areas and rural areas where limited digital service access hampers rural communities.

Digital divides, marked by inequalities in access to, and utilisation of, digital technologies, are a considerable impediment to narrowing the disparities between regions, nations, and socio-economic strata (Lazovic and Durickovic, 2014). The capacity to deploy technology plays a vital role in digital transformation, evident in the unequal distribution of technologies due to limited capabilities. Technological advancements have led to increased market concentration, have reduced competition, and have posed challenges for MSMEs and start-ups striving for competitiveness.

Moreover, at the core, digital divides are not only about infrastructure, but also about human capital. The COVID-19 pandemic and technological disruptions have pushed marginalised workers in some AMS towards informal sector activities due to limited digital skills, whilst a significant portion of professionals have transitioned to remote work as employers digitise processes (Intaratat, 2022). The concept of the 'digital divide' has evolved to spotlight the skills gap between individuals with digital proficiency and those without. Possessing digital skills yields benefits such as employment opportunities, increased income, and improved social outcomes, whilst their absence hampers prospects (OECD, 2016). The contrast between the rising demand for advanced digital skills and the existing proficiency levels within the ASEAN workforce becomes increasingly apparent. For instance, to stay competitive, Singapore requires 1.2 million more digital workers by 2025, whilst Indonesia needs to secure an additional 600,000 digital talents by 2030 (Martinus and Seth, 2023).

2.5. Environmental Sustainability

It is recognised that the emergence of digital platforms and digital trade has led to a reduction in physical storefront consumption and an increase in waste production. Telecommunication is expected to cut carbon emissions, supporting the long-term health of our environment. However, contemporary digital technologies still incur environmental costs. Fuchs (2006) notes a misconception about telework, highlighting that its perceived reduction in environmental pollution and the need to travel is because teleworkers constitute only a small proportion of the overall workforce. Telework fosters new social connections, leading to increased travel. Whilst work-related travel contributes minimally to total carbon dioxide emissions, the overall distance travelled per worker is steadily increasing.

The growing awareness of digital technologies should be paired with a nuanced understanding of their environmental impact, both short- and long-term. Artificial intelligence (AI) and related digital technologies have significant environmental consequences, with notable carbon dioxide emissions linked to the energy consumption required for handling extensive data, mineral extraction for manufacturing technological components, and the generation of electronic waste (Samuel, Lucivero, and Somavilla, 2022). Therefore, the environmental costs of digital transformation should not be underestimated. A comprehensive understanding of these challenges is crucial to guide responsible, ethical, and sustainable progress in digital technologies.

3. The ASEAN Frameworks on Digitalisation (2016–2023)

This section presents an overview of the existing ASEAN digital frameworks and work plans established from 2016 to 2023, highlighting the region's commitment to embracing digital transformation.²

² The existing ASEAN initiatives, masterplan, frameworks, work plans, and action plans are ASEAN (2016; 2018; 2019; 2020a; 2020b; 2021a; 2021b; 2021c; 2021d; and 2023).

3.1. ASEAN Framework on Personal Data Protection (2016)

In 2016, to promote the responsible use and protection of personal data within the region, AMS agreed to form the ASEAN Framework on Personal Data Protection (ASEAN, 2016). The framework was established in response to the increasing importance of personal data in the digital economy and the need for a common set of principles and standards for data protection. The framework aims to establish a harmonised approach to personal data protection across AMS, promoting consistency and interoperability in data processing practices. It is intended to provide individuals with greater control over their personal data and foster trust in the digital economy. Key principles of the ASEAN Framework on Personal Data Protection include consent, notification and purpose, accuracy of personal data, security safeguards, access and correction, transfers to another country or territory, retention, and accountability.

One thing we note is that the ASEAN Framework on Personal Data Protection is a non-binding document, and its implementation is voluntary for AMS. However, it serves as a reference for AMS to develop or revise their national laws and regulations on personal data protection. Several AMS, such as Malaysia and Singapore, have already enacted legislation based on the framework. Whilst the framework provides a general structure for personal data protection, data protection laws and regulations vary amongst AMS. This can lead to inconsistencies and challenges when it comes to harmonising data protection practices across the region. The framework also aims to facilitate cross-border data transfers, but ensuring adequate protection for data transferred outside ASEAN may pose challenges. The lack of harmonised international data protection standards can make it difficult to ensure consistent protection of personal data in cross-border transactions.

3.2. ASEAN Digital Data Governance Framework (2018)

In 2018, the ASEAN Telecommunications and Information Technology Ministers Meeting endorsed the ASEAN Digital Data Governance Framework (ASEAN, 2018). The framework comprises four strategic priorities based on several principles. The first strategic priority focuses on the data life cycle and ecosystem, emphasising principles of data integrity, data use and access control, and data security. The second strategic priority centres on cross-border data flows, which consist of principles to ensure free data movement whilst upholding trust through ensuring requirements on cross-border data flows. The third strategic priority is digitalisation and emerging technologies, building principles on capacity development and upskilling for universities, organisations, and MSMEs. The fourth priority addresses legal, regulatory, and policy aspects, which consist of principles on harmonised personal data protection regulations, accountability in policy implementation, and the promotion of best practices in data governance across AMS.

In terms of framework implementation, AMS must provide regular biannual updates on their progress in implementing the framework within their respective working group levels. This approach can be utilised to oversee the advancements of each AMS concerning the framework. Subsequently, the framework's implementation plan centres on the establishment of the annual ASEAN Data Protection Forum, where AMS present their updates during the forum sessions. Since the framework is non-binding, it does not establish any legal rights or responsibilities for AMS, either domestically or internationally. The non-binding nature of the framework makes it hard to monitor its enforcement and implementation in ASEAN. In addition, commitment levels have differed since the framework lacks the legal obligations required, affecting the overall implementation across the ASEAN region.

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

Digital integration has begun to be considered crucial to close the digital divide and promote a more inclusive digital environment in the ASEAN region. Therefore, in 2019, ASEAN endorsed the ASEAN Digital Integration Framework Action Plan, 2019–2025 (DIFAP)(ASEAN, 2019) as a strategic framework to make it easier for AMS to integrate digital technologies and projects. The framework presents a thorough strategy for maximising the advantages of digital transformation, encouraging regional collaboration, and fostering economic progress in the digital era.

The DIFAP identifies the following key priority areas for digital integration: (i) facilitating seamless trade; (ii) protecting data whilst supporting digital trade and innovation; (iii) enabling seamless digital payments, which are crucial for promoting cross-border digital trade; (iv) broadening the digital talent base by partnering with the private sector on digital skills roadmaps and prioritised sectors in carrying out the upskill programmes; (v) helping emerging digital MSMEs' ease of doing business and navigating the business ecosystem to succeed; and (vi) establishing a designated ASEAN body to coordinate actions for the various areas of this digital integration framework, which includes effective prioritisation, as well as supervising and regulating the timelines and objectives.

To promote the digital integration progress within ASEAN, the six prioritised domains are transformed into a strategic roadmap known as the DIFAP. This plan delineates specific ASEAN bodies that are accountable for the implementation of the outlined initiatives. The coordinating sectoral body for the framework is the ASEAN Coordinating Committee on Electronic Commerce or its successor body.

The DIFAP integrates the correlated goals and strategies from the ASEAN Economic Community (AEC) Blueprint 2025. Notably, this encompasses the ASEAN ICT Masterplan 2020, the ASEAN Work Programme on Electronic Commerce 2017–2025, the Master Plan on ASEAN Connectivity 2025, and pertinent strategic action plans. Furthermore, the document summarises initiatives, outputs, timelines, implementing bodies, and implementation.

However, it is important to note that some initiatives within the DIFAP have not yet been implemented and there are no updated versions of the original DIFAP document available to track progress, outcomes, or further implementation efforts. Finally, the implementation of the DIFAP may face hurdles due to differences in country agendas, legislative complications, infrastructure limits, skills shortfalls, and data privacy issues. ASEAN consists of countries at diverse socio-economic stages, so the differences in development stages of AMS create obstacles to applying and implementing a one-size-fits-all framework within the region, without accounting for a country's specific conditions and needs.

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

In 2021, ASEAN agreed on the Work Plan on the Implementation of ASEAN Agreement on Electronic Commerce (ASEAN, 2021d), which builds on the ASEAN region's ongoing efforts to support better regional e-commerce growth. The work plan is a living document that can be adjusted and altered, as necessary. By facilitating cross-border e-commerce transactions, creating an enabling environment of trust and confidence, and strengthening cooperation within the ASEAN region, this work plan envisions increasing the overall size of its digital economy by 2025 to represent a leading digital community that is competitive, inclusive, and forward-looking.

The work plan is divided into three high-level workstreams, which serve as priority areas that contribute to achieving the work plan's vision: (i) the cross-border focus tackles plans, initiatives, and leading e-commerce sector policies on a national level to increase cross-border coherence in ASEAN; (ii) the business focus tackles concerns that directly impact e-commerce business; and (iii) the consumer focus tackles concerns that directly impact e-commerce consumers.

To ensure that the work plan's vision is achieved, it is important to note that external parties, better known as 'workstream enablers,' play a key role. These workstream enablers provide collaboration on national e-commerce development, domestic capacity-building initiatives, donor partner support and financing, digital infrastructure connectivity, and data collection. The workstream objectives and activities include horizontal activities such as the Laws Reporting Scheme and associated activities, annual business surveys, the ASEAN Consumer Empowerment Index, stakeholder engagement activities, and pilot projects.

The annex of the work plan contains each desired outcome along with the associated metrics, including the key performance indicators, the target timeline, and the lead implementation body. From our assessment, the absence of an online update regarding the progress of the work plan is one of the notable drawbacks. Whilst the annex provides a comprehensive breakdown of the desired outcomes, associated indicators, activity details, implementation timelines, and responsible bodies, the lack of accessible information about the up-to-date status of the work plan overall is a limitation. Progress may have been made in specific areas and lead implementation bodies. However, tracking this progress effectively is challenging without easily accessible real-time information on the overall status of the work plan.

3.5. ASEAN Comprehensive Recovery Framework (2020)

Adopted at the 37th ASEAN Summit in November 2020, the ASEAN Comprehensive Recovery Framework (ACRF) (ASEAN, 2020a) serves as the consolidated exit strategy for the region from the COVID-19 crisis. It focuses on five broad strategies that prioritise health, humans, the economy, and digitalisation. One of its broad strategies focuses on accelerating inclusive digital transformation within the ASEAN region. Promoting e-commerce and the digital economy is one of the priorities, along with other initiatives on e-government and e-services, digital connectivity, the use of ICT in education, and the digital transformation of MSMEs. This framework also addresses the need for investment in digital infrastructure that focuses on data governance, cybersecurity, the legal framework, and institutional capacity.

Of the five broad strategies presented in the framework, broad strategy four on digitalisation aims to achieve several objectives. These include launching the ASEAN Access web portal, enhancing the implementation of the Go Digital ASEAN initiative to support the digital transformation of MSMEs in the region, adopting the Consolidated Strategy on the Fourth Industrial Revolution, launching the ASEAN Digital Integration Index Report, implementing the ASEAN Agreement on Electronic Commerce Work Plan, promoting good governance through digital innovation and the digitalisation of public services, advancing financial inclusion, and strengthening data governance and cybersecurity within the region.

The annex of the ACRF details the key priorities and initiatives. Nonetheless, no single, readily available, and easily traceable document permits monitoring of the progress of the ACRF's implementation. This absence results in a lack of transparency and accountability in the implementation of the plan. Moreover, the framework faces obstacles such as uneven implementation because AMS have different priorities and resources, a lack of enforceability (the framework is non-binding), funding restrictions, coordination problems, the potential exclusion of marginalised groups, ambiguous environmental strategies, and difficulties in tracking progress. In addition, due to the changing nature of the COVID-19 pandemic and subsequent recovery, priorities have changed since the ACRF was enacted in September 2020. As the repercussions from the pandemic are felt, the framework might not fully consider newly discovered problems or shifting dynamics.

3.6. ASEAN Digital Masterplan 2025 (2021)

The ASEAN Digital Master Plan (ADM) 2025, developed in 2021, envisions 'ASEAN as a leading and digital community and economic bloc, powered by secure and transformative digital services, technologies, and ecosystem' (ASEAN, 2021b:4). To accomplish the vision, key economic players – such as governments, regulators, and market players – should complement one another by working together to invest in new technologies, abolishing regulations that serve as market process barriers, fostering digital inclusion, and delivering high-speed connectivity through high-quality telecommunications infrastructure. ADM 2025 specifies three conditions to be met by governments and regulators to achieve the vision, which are providing high-quality connectivity across the ASEAN region through the telecommunications infrastructure, providing safe connections to fulfil the needs of end users, and performing other actions to boost digital literacy and digital skills to enhance productivity.

Demand for digital services has accelerated in ASEAN since the outbreak of the COVID-19 pandemic in 2020. However, the recessionary impacts of the pandemic have adversely affected users' ability to pay for these services. ADM 2025 plays a key role in speeding up the recovery from the COVID-19 pandemic. This can be achieved through governments, regulators, and key players funding the priority programmes, removing regulatory barriers, mitigating adverse pandemic impacts on the poor through digital inclusion, providing access to e-education and e-health services, reinvigorating trade after the pandemic, increasing the use of digital services to enhance the number of users and trust in the system, strengthening investment incentives for market players and governments, and dealing with climate change.

The Implementation of ADM 2025 requires that the indicators of each desired outcome be measured. Measuring the utilisation of digital services is an indicator of success in the completion of the ADM 2025 vision. This is because the uptake of digital services goes hand in hand with infrastructure and skills, thus it measures the overall effect of all elements in ADM 2025. The level of uptake in digital services in the ASEAN region can also serve as a basis for comparing ASEAN with other leading regions in digital services.

Despite its laudable strategic vision, our assessment notes that one of ADM 2025's limitations lies in the rapidly changing dynamics of the digital world. There are concerns about the 5-year duration of the master plan, as many aspects of the digital landscape are likely to evolve during the implementation period, requiring some initiatives to be revised to remain relevant.

3.7. ASEAN Data Management Framework (2021)

The ASEAN Data Management Framework (DMF) was designed to support the data life cycle and ecosystem strategic priority (ASEAN, 2021a). The DMF aims to assist all businesses operating in ASEAN to participate in the digital economy and practice data governance across all data types within an organisation throughout the data life cycle and to consider adequate protection for diverse types of data. With the DMF, organisations are better equipped to protect data and instil trust and confidence in their customers and organisations they interact with, whilst the data are leveraged for business innovation purposes. The DMF is designed to be customisable and adaptable to meet the specific data management requirements of businesses, allowing them to tailor it to their data management systems. 'Data,' as used in the DMF, refers to all data that a business creates, collects, accesses, processes, and transfers. This may include both personal and business transactional data. The DMF is intended for the use of all private sector businesses operating in ASEAN, including small and medium-sized enterprises.

The DMF aims to guide the effective management of data within AMS. However, we have identified certain shortcomings to consider in its implementation: (i) varied data management practices – AMS have different levels of maturity in terms of data management practices; (ii) limited adoption – the DMF is not legally binding and its adoption is voluntary, so not all AMS may choose to implement or fully adhere to the framework, resulting in the fragmentation of data management practices; and (iii) resource constraints – implementing effective data management practices requires financial, technological, and human resources, and some AMS may have limited resources and capacity to invest in data management capabilities, which could hinder the successful implementation of the framework.

3.8. Bandar Seri Begawan Roadmap (2021)

In 2021, as a response to the COVID-19 pandemic, which forced the region to accelerate the adoption of digital technology, ASEAN endorsed a digital roadmap that is referred to as the Bandar Seri Begawan Roadmap (BSBR) (ASEAN, 2021c). The BSBR is a digital transformation agenda for ASEAN to accelerate economic recovery and the integration of the digital economy. Through the roadmap, ASEAN aims to ensure that digital transformation within the region provides equitable benefits to all AMS. The BSBR aims to serve as a tool to achieve strong commitment and coherency in the ASEAN region and prioritise action on the use of technology as one of the key economic drivers within and across AMS.

The roadmap for 2021–2025 is divided into three phases: recovery (2021–2022), acceleration (2022–2024), and transformation (2025). The recovery phase consists of five measures that aim to accelerate the region's economic recovery and harness digital technology adoption as one of the region's efforts in the recovery phase (resume essential travel and strengthen institutional mechanisms and capacities

in the ASEAN Secretariat and relevant sectoral bodies). The acceleration phase consists of four measures that aim to include work from the DIFAP and accelerate its progress, including advancing trade facilitation and digitalisation, enabling cross-border digital payments, establishing a unified Internet Protocol services platform for ASEAN, and conducting a study on the ASEAN digital economy. The transformation phase consists of one measure to make the region a community of opportunity for all, as it aims to establish an open, secure, interoperable, competitive, and inclusive regional digital economy in the broader AEC-building agenda.

The ASEAN Coordinating Committee on Electronic Commerce functions as the coordinating sectoral body for the BSBR, with supervision from the Senior Economic Officials Meeting (SEOM) and contributions from representatives of the respective sectoral bodies of each AMS. SEOM will provide regular updates on the progress of the roadmaps to the AEC Council. Considering the complexity and multifaceted nature of the BSBR, progress on the roadmaps should be communicated regularly to relevant ministerial groups. The complexity of implementing the BSBR presents a challenge in coordination and cross-sectoral collaboration, as well as enforcement and compliance. Harmonising efforts amongst stakeholders and cooperation amongst various sectors could be particularly problematic due to different perspectives, priorities, and regulations within each sector.

3.9. Boracay Digital Declaration (2023)

In February 2023, at the third ASEAN Digital Ministers' Meeting, AMS adopted the Boracay Digital Declaration (BDD) (ASEAN, 2023). The BDD is a non-binding agreement that focuses on digital transformation and the digital economy within the ASEAN region. It recognises the importance of (i) a digitally inclusive society by addressing the digital divide; (ii) a trusted, secure, and safe digital market by adopting digital data governance, including data management, cybersecurity, and AI governance; and (iii) people-centred digital transformation. The declaration emphasises the need for regional cooperation to harness the benefits of the digital revolution and ensure inclusive and sustainable development.

The BDD has five key areas: (i) digital connectivity – acknowledging the importance of enhancing regional digital infrastructure and connectivity to promote seamless digital trade, investment, and collaboration; (ii) digital skills – highlighting the significance of developing digital skills and capabilities amongst ASEAN citizens to empower them to participate in the digital economy and leverage digital technologies effectively; (iii) digital innovation – recognising the role of digital innovation in driving economic growth and encouraging support for digital entrepreneurship and innovation ecosystems within the ASEAN region; (iv) digital trade facilitation – emphasising the need to create an enabling environment for digital trade, including e-commerce, by developing frameworks and regulations that facilitate cross-border digital transactions and reduce barriers to trade; and (v) cybersecurity and data protection – stressing the importance of enhancing cybersecurity measures and promoting data protection to build trust and confidence in digital transactions and technologies.

The implementation of the BDD requires coordination and collaboration amongst multiple stakeholders, including government agencies, private sector organisations, and civil society. Without effective implementation and alignment of strategies across countries, the BDD may not adequately address the existing digital divide within ASEAN, potentially leaving certain populations and regions at a disadvantage in terms of benefiting from digital transformation. Successful implementation of the BDD relies on factors beyond technology, such as education, skills development, and socio-economic conditions. Inclusivity and the ability to address socio-economic disparities are crucial to ensure that all segments of society share the benefits of digital transformation.

3.10. ASEAN Digital Economic Framework Agreement (2023)

The Digital Economic Framework Agreement (DEFA), which has been discussed since 2022, aims to establish an integrated and inclusive digital landscape within the region, with a focus primarily on e-commerce and digital trade. The AEC endorsed the DEFA Council at their 23rd Meeting during Indonesia's ASEAN Chairmanship on 3 September 2023 in Jakarta. It will be followed by the launch of negotiations, which are targeted to be completed by the end of 2025. The ASEAN Coordinating Committee on Electronic Commerce and Digital Economy, in collaboration with pertinent ASEAN sectoral bodies, and with the support of the ASEAN Secretariat, will be responsible for conducting the negotiations.

The ASEAN DEFA negotiations encompass a wide range of elements. These include digital trade to enhance cross-border trade through electronic processes, cross-border e-commerce for efficiency and fairness, digital payments and e-invoicing to foster innovation and regulation, digital identification and authentication for interoperable recognition, online safety and cybersecurity for a secure digital environment, cross-border data flows and data protection, competition policy for transparency and consumer choice, cooperation on emerging topics such as AI regulation, and talent mobility and cooperation to facilitate the movement of digital talent and collaboration in talent development within the region.

3.11. Overall Review

Although ASEAN's endeavours have undeniably propelled digital advancements in the region, one of the main criticisms of DEFA, the latest framework – as well as for the other ASEAN roadmaps, frameworks, work plans, and action plans – is that it is limited to economic issues. The other key issues have not yet been covered (e.g. security, political, and socio-cultural issues).

The limitations of the existing frameworks on ASEAN's digital economy stem from a range of hurdles that hinder the effectiveness of their implementation. One of these is the absence of a clear enforcement mechanism given the nature of the non-binding agreements and non-established legal obligations. The lack of a designated mechanism for real-time reporting on the progress of the frameworks' desired outcomes raises further questions regarding accountability and transparency during implementation. Stakeholders and the public have limited access to data on the progress of the frameworks' desired outcomes and objectives. In addition, the varied socio-economic landscape in ASEAN plays a key role in determining the feasibility of the digital frameworks' implementation. This includes differences in resources, digital adoption, infrastructure development, priorities, laws, and regulations amongst AMS. Furthermore, since the digital ecosystem is dynamic, digital frameworks must evolve to remain relevant in a digitalised ASEAN community.

4. The ASEAN Digital Community 2045

ASEAN faces diverse challenges on its digitalisation journey and requires a 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 is on the economic sector, particularly in digital trade. Notably, the existing frameworks, whilst promising, lack a commitment to implementation and an evaluation mechanism, and they do not serve as a long-term vision for ASEAN.

Recognising the extensive potential and simultaneous challenges linked to digitalisation, ASEAN needs to oversee the comprehensive development of digitalisation across multiple domains. This endeavour should extend beyond the economic sector to encompass security, political, and socio-cultural aspects. To effectively address these challenges and fully embrace digital transformation, ASEAN should prioritise the development of a comprehensive framework that includes implementation commitment and evaluation mechanisms.

During the sidelines of the 42nd ASEAN Summit on 11th May 2023 in Labuan Bajo, Indonesia, ASEAN leaders directed ASEAN experts to craft a robust and inspiring vision for the next 20 years. The decision to formulate the 2045 vision followed the Leader's inaugural engagement with the High-Level Task Force on the ASEAN Community Post-2025 Vision. In 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, the leaders 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 whilst honouring its identity.

The ASEAN Digital Community (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.

4.1. Three Pillars of the ASEAN Digital Community 2045

The ASEAN community is envisioned as a community with increased capacity and with the ability to effectively respond to problems and exploit opportunities (ASEAN, n.d.). ASEAN community comprises three pillars: (i) The ASEAN Political Security Community (APSC); (ii) The AEC; and (iii) The ASEAN Socio-Cultural Community. The APSC aims to achieve peace, stability, and cooperation in the region through political dialogue and conflict resolution mechanisms. The AEC focuses on economic integration, promoting free trade, investment, and the facilitation of goods and services across AMS. The ASEAN Socio-Cultural Community aims to enhance social inclusion, cultural diversity, and community engagement amongst the people of ASEAN.

These three pillars work together to create a unified and cohesive ASEAN community that strives for regional peace, stability, economic prosperity, and social progress. As ASEAN embraces digital transformation and seeks to leverage its potential, it is proposed that the ASEAN Digital Community 2045 will address digitalisation issues and advancements across these three main pillars of the ASEAN community.

4.1.1. The ASEAN Digital Political Security Community

The APSC is witnessing the profound impact of digital technology on democratic politics and military advancements. The rapid evolution of technology has transformed elections, campaigning, and communication – providing new infrastructure for public engagement and expanding opportunities for participation. However, the potential challenges and implications of digitalisation in politics are yet to be fully understood and addressed. Simultaneously, military technology has seen remarkable progress, with hybrid strategies combining automation, cyber programmes, robotics, AI, and cyberwarfare. Innovations such as digital healthcare automation, hypersonic missiles, the Internet of Military Things, and immersive technologies are shaping the future of military operations. Border surveillance, security imaging, joint military training in the metaverse, and other developments highlight the growing significance of digital technology in the APSC.

This digital transformation brings both opportunities and challenges. On one hand, digital technology enhances the efficiency and effectiveness of democratic processes, such as elections and public engagement, allowing for greater participation and transparency. On the other hand, it also presents new risks and threats, including cyber-attacks, 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 strengthen its capacity in cybersecurity, intelligence gathering, and defence against emerging cyber threats (Bhattacharyya, 2010). Additionally, cooperation and collaboration amongst AMS in sharing information, best

practices, and developing joint strategies is essential to address the evolving challenges posed by digital technology in the APSC. The establishment of the ASEAN Digital Community 2045 can serve as a strategic framework to guide AMS in navigating the digital landscape and addressing these opportunities and challenges.

4.1.2. The ASEAN Digital Economic Community

The AEC aims to transform ASEAN into a unified market and production base, fostering competitiveness, equitable economic development, and seamless integration into the global economy. Projections indicate that ASEAN's digital trade could reach up to \$1 trillion by 2030 (Baijal, et al., 2022). To realise its potential and prevent any member country from being left behind, ASEAN must harness the power of digital technology to drive its transformation.

Envisioning the ASEAN Digital Economic Community 2045 is crucial for ensuring sustained prosperity, sustainable development, and inclusive growth in the era of AI and digitalisation. This initiative will enable ASEAN to capitalise on digital technology's potential to boost economic expansion, foster inclusivity, and bolster regional cohesion. By establishing the ASEAN Digital Economic Community 2045, ASEAN can streamline the flow of digital goods, services, and investments amongst AMS, thereby creating a dynamic digital economy whilst promoting collaboration amongst AMS to shape digital policies, regulations, and standards. This collective effort will facilitate the cohesive development of digital ecosystems across the region, enhancing its global competitiveness and resilience in the digital era.

4.1.3. The ASEAN Digital Socio-Cultural Community

Digital technology has showcased its transformative potential 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 Digital Socio-Cultural Community stands as a testament to the commitment to empower ASEAN citizens to 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 sphere 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 ASEAN nations to showcase their heritage and traditions on a global platform. Moreover, ASEAN has the potential to

foster greater connectivity and collaboration amongst Member States. 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 ASEAN Digital Community 2045

The ASEAN Digital Community 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 embrace 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. Whilst 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. Productivity

The optimal utilisation of digital technology should aim to enhance value-added, revolutionise business models, and support development across all sectors. Whilst significant 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 to empower 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 towards 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, the establishment of regional standards, and the provision of training on green digital transformation and the circular economy.

In conclusion, 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.

5. Follow-up Actions

The ADC 2045 aims to serve as a long-term vision for ASEAN to enhance the development of the region's digital landscape, aligning with the three pillars of ASEAN. To date, ADC 2045 has been endorsed by the AMS in the ASEAN Leaders' Declaration on ASEAN as an Epicentrum of Growth during the 43rd ASEAN Summit on 5th September 2023 (ASEAN, 2023). The leaders acknowledge that only through a steadfast commitment to a long-term digital vision can ASEAN optimise the use of digital technologies for its people, ensuring sustainable and inclusive growth for the entire region. To actualise this vision, ASEAN must now undertake follow-up actions to establish a thriving and comprehensive digital community by 2045.

First, it is imperative for ASEAN to embark on a feasible action plan as a strategic and concerted path forward. Translating aspirations into tangible outcomes requires the formulation of a comprehensive ASEAN action plan with clear targets. This plan should be complemented by individual national plans aligned with regional goals and accompanied by annual targets to ensure progress tracking.

Second, the completion of both national and regional action plans should be accompanied by a robust review and evaluation process. This critical step ensures an assessment of the effectiveness of policies and their implementation. A specific strategy involves addressing the need to mobilise resources for both physical and digital connectivity. It is essential for ASEAN to implement connectivity projects with adequate resources, ensuring seamless interconnectedness within the region.

Last, governments across ASEAN should prioritise upscale programmes to develop human capital at both regional and national levels. This involves (i) enhancing workers' skill sets through vocational training, enabling them to compete and excel in job markets; (ii) improving technological adoption and digital literacy rates by integrating digitalisation into the education curriculum and providing business incentives for utilising digital technologies; (iii) supporting entrepreneurs to create new businesses and foster innovation; and (iv) raising awareness of sustainable digital practices and amplifying research on environmentally friendly technologies.

ASEAN faces a significant journey to shape its digital economic community. The imperative lies in detailed and transparent coordination amongst AMSs, complemented by the formation of a task force. This is essential to ensure clear measures, indicators, and traceability of each AMS' digital economy status, advancing its digital development agenda. The envisioned realisation of the ASEAN Digital Community 2045 aims to empower the region to mount more adept responses to global economic disruptions and uncertainties. Furthermore, this initiative seeks to position ASEAN as a key player in the global digital economy, striving to achieve sustainable development with a commitment to leaving no one behind.

References

- Asian Development Bank (ADB) (2022), *Asian Economic Integration Report 2022: Advancing Digital Services Trade in Asia and the Pacific*. Manila: Asian Development Bank. <https://www.adb.org/publications/asian-economic-integration-report-2022>
- Association for Southeast Asian Nations (ASEAN) (2016), *Framework on Personal Data Protection*. Jakarta: ASEAN Secretariat. <https://asean.org/wp-content/uploads/2012/05/10-ASEAN-Framework-on-PDP.pdf>
- (2018), *Framework on Digital Data Governance*. Jakarta: ASEAN Secretariat. https://asean.org/wp-content/uploads/2012/05/6B-ASEAN-Framework-on-Digital-Data-Governance_Endorsedv1.pdf
- (2019), *ASEAN Digital Integration Framework Action Plan (DIFAP) 2019–2025*. Jakarta: ASEAN Secretariat. https://asean.org/wp-content/uploads/2018/02/AECC18-ASEAN-DIFAP_Endorsed.pdf
- (2020a), *ASEAN Comprehensive Recovery Framework*. Jakarta: ASEAN Secretariat. https://asean.org/wp-content/uploads/2021/09/ASEAN-Comprehensive-Recovery-Framework_Pub_2020_1.pdf
- (2020b), *ASEAN Comprehensive Recovery Framework: Implementation Plan*. Jakarta: ASEAN Secretariat. https://asean.org/wp-content/uploads/2021/08/ACRF-Implementation-Plan_Pub-2020.pdf
- (2021a), *ASEAN Data Management Framework: Data Governance and Protection Throughout the Data Lifecycle*. Jakarta: ASEAN Secretariat. https://asean.org/wp-content/uploads/2-ASEAN-Data-Management-Framework_Final.pdf
- (2021b), *ASEAN Digital Masterplan 2025*. Jakarta: ASEAN Secretariat. <https://asean.org/wp-content/uploads/2021/09/ASEAN-Digital-Masterplan-EDITED.pdf>
- (2021c), *The Bandar Seri Begawan Roadmap: An ASEAN Digital Transformation Agenda to Accelerate ASEAN's Economic Recovery and Digital Economy Integration*. Jakarta: ASEAN Secretariat. https://asean.org/wp-content/uploads/2021/10/Bandar-Seri-Begawan-Roadmap-on-ASEAN-Digital-Transformation-Agenda_Endorsed.pdf
- (2021d), *Work Plan on the Implementation of ASEAN Agreement on Electronic Commerce*. Jakarta: ASEAN Secretariat. https://asean.org/wp-content/uploads/2021/09/Work-Plan-Ecommerce-Agreement_Annex-A_Endorsed.pdf
- (2022), *ASEAN Statistical Yearbook 2022*. Jakarta: ASEAN Secretariat. <https://www.aseanstats.org/publication/asyb2022/>
- (2023), *Boracay Digital Declaration*. <https://asean.org/wp-content/uploads/2023/02/Boracay-Aklan-Digital-Declaration-ADOPTED-1.pdf>
- (n.d.) *Our Communities*. Jakarta: ASEAN Secretariat <https://asean.org/our-communities/>

- Baijal, A., F. Hoppe, W. Chang, S. Davis, and F.W. Hoong (2022), 'e-Conomy SEA 2022: Through the Waves, Towards a Sea of Opportunity', *Bain & Company*, 27 October. <https://www.bain.com/insights/e-conomy-sea-2022/>
- Bhattacharyya, A. (2010), 'Understanding Security in Regionalism Framework: ASEAN Maritime Security in Perspective', *Maritime Affairs: Journal of the National Maritime Foundation of India*, 6(2), pp. 72–89. <https://doi.org/10.1080/09733159.2010.559786>
- Benavides, L.M.C., J.A. Tamayo Arias, M.D. Arango Serna, J.W. Branch Bedoya, and D. Burgos (2020), 'Digital Transformation in Higher Education Institutions: A Systematic Literature Review', *Sensors*, 20(11), p.3291. <https://pubmed.ncbi.nlm.nih.gov/32526998/>
- Dabla-Norris, E., et al. (2023), 'Accelerating Innovation and Digitalization in Asia to Boost Productivity', *Departmental Papers*, Washington, DC: International Monetary Fund. <https://www.imf.org/en/Publications/Departmental-Papers-Policy-Papers/Issues/2023/01/08/Accelerating-Innovation-and-Digitalization-in-Asia-to-Boost-Productivity-523807>
- Economist Impact (EIU) (2022), *The Inclusive Internet Index*. London: The Economist Group. <https://impact.economist.com/projects/inclusive-internet-index/>
- Fuchs, C. (2006), 'The Implications of New Information and Communication Technologies for Sustainability', *Environment, Development, and Sustainability*, 10, pp. 291–309. <https://link.springer.com/article/10.1007/s10668-006-9065-0>
- 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. DOI:10.1108/SEAMJ-02-2023-0023
- Infrastructure Asia (n.d.), *The Catalytic Role of Digital Connectivity*. Singapore: Infrastructure Asia. <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). <https://www.eria.org/research/asean-digital-community-2040/>
- 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. https://www.researchgate.net/publication/357501406_Digital_Literacy_Digital_Skills_Scenario_of_ASEAN_Marginal_Workers_Under_Post_COVID-19_Pandemic
- Kolbanev, M.O., I.I. Palkin, and T.M. Tatarnikova (2020), 'The Challenges of the Digital Economy', *Hydrometeorology and Ecology*, 5, pp.156–67. <https://www.semanticscholar.org/paper/The-challenges-of-the-digital-economy-Kolbanev-Tatarnikova/f3856bfb877f36ae5f13e3021cb730e33ffe6a9a>

- Lazovic, V. and T. Durickovic (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)*. Rijeka, Croatia: Croatian Society for Information and Communication Technology, Electronics and Microelectronics (MIPRO), pp.1580–85. <https://ieeexplore.ieee.org/document/6859817>
- Lee, Y. (2021), 'Southeast Asia is World's Fastest-Growing Mobile Wallet Market', *Bloomberg News*, 8 July. <https://www.bloomberg.com/news/articles/2021-07-08/southeast-asia-is-world-s-fastest-growing-mobile-wallet-market>.
- López González, J. and M. Jouanjean (2017), 'Digital Trade: Developing a Framework for Analysis', *OECD Trade Policy Papers*, 205, Paris: Organisation for Economic Co-operation and Development (OECD) Publishing, <https://doi.org/10.1787/524c8c83-en>.
- Martinus, M., and F.N. Seth (2023), 'Current Key Drivers of ASEAN Integration: Digital Skills and Mobilities', 6 July. <https://fulcrum.sg/current-key-drivers-of-asean-integration-digital-skills-and-mobilities/>
- 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. DOI:10.1145/3209415.3209493
- Organisation for Economic Co-operation and Development (OECD) (2016), *Innovating Education and Educating for Innovation: The Power of Digital Technologies and Skills*. Paris: OECD. https://www.oecd.org/en/publications/innovating-education-and-educating-for-innovation_9789264265097-en.html
- (2019), *Unpacking E-commerce: Business Models, Trends and Policies*, Paris: OECD Publishing. <https://doi.org/10.1787/23561431-en>.
- (2023), *Key Issues in Digital Trade Review*. Paris: OECD. <https://doi.org/10.1787/b2a9c4b1-en>. [Accessed on 14 March 2024].
- 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. DOI:10.1007/978-3-319-61161-7_14
- Samuel, G., F. Lucivero, and L. Somavilla (2022), 'The Environmental Sustainability of Digital Technologies: Stakeholder Practices and Perspectives', *Sustainability* 2022, 14, 3791. <https://doi.org/10.3390/su14073791>.
- Singapore Institute of International Affairs (SIIA) (2022), *Charting ASEAN's Digital Future: Emerging Policy Challenges*. Singapore: Singapore Institute of International Affairs. <https://www.siiasonline.org/charting-aseans-digital-future-emerging-policy-challenges/>
- Statista (2022a), *Digital Health – Market Data Analysis and Forecast*. Hamburg: Statista. <https://www.statista.com/study/116507/digital-health-report-2022/#:~:text=The%20Digital%20Health%20market%20consists,US%24256.3%20billion%20by%202027>.

- (2022b), *eCommerce — ASEAN*. Hamburg: Statista. <https://www.statista.com/outlook/emo/ecommerce/asean?currency=USD> (accessed 13 March 2024)
- (2023), *Digital Payments – Southeast Asia*. Hamburg: Statista. <https://www.statista.com/outlook/dmo/fintech/digital-payments/southeast-asia> (accessed 6 July 2023).
- (2024), *Retail E-Commerce Sales Worldwide from 2014 to 2027*. Hamburg: Statista. <https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/> (accessed 12 December 2024).
- Suvannaphakdy, S. (2022), *Better Safeguards Needed for Trusted Data Use in ASEAN Countries*, Singapore: 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/>
- Tang, D. (2021), 'What Is Digital Transformation?' *The EDP Audit, Control, and Security Newsletter (EDPACS)*, 64(1), pp.9–13. <https://doi.org/10.1080/07366981.2020.1847813>
- United Nations Conference on Trade and Development (UNCTAD) (2022), 'Digital Trade: Opportunities and Actions for Developing Countries', *Policy Brief*, 92, Geneva: UNCTAD. <https://unctad.org/publication/digital-trade-opportunities-and-actions-developing-countries>
- United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and ASEAN (2021), *Digital and Sustainable Trade Facilitation in the Association of Southeast Asian Nations (ASEAN) 2021*. Bangkok: UNESCAP and Jakarta: ASEAN Secretariat. https://asean.org/wp-content/uploads/2022/01/ASEAN-report-2021-FINAL_Low-res.pdf
- World Economic Forum (WEF) (2021), *ASEAN Digital Generation Report: Pathway to ASEAN's Inclusive Digital Transformation and Recovery*. Davos: WEF. https://www3.weforum.org/docs/WEF_ASEAN_Digital_Generation_2021.pdf