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ASEAN in the Post-2025 Digitally Empowered Factory Asia

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1. Introduction

The Association of Southeast Asian Nations (ASEAN) has long been distinguished for its unique approach to regional integration, prioritising market-driven (de facto) processes over formal (de jure) mechanisms. This strategy has fuelled cross-border production linkages and fostered economic cooperation amongst its member states (Baldwin, 2005; Venables et al., 2006; Chen, 2007; Kimura, 2008; Nicholas, 2010). Over the past decade, ASEAN's strategic landscape has shifted substantially. The establishment of the ASEAN Economic Community (AEC) in 2015 marked a milestone, representing a pivotal step rather than an endpoint of ASEAN's integration journey (Chen et al., 2017; Intal and Chen, 2017; Rillo, 2018). The AEC Blueprint 2025, succeeding the 2015 blueprint, aims to advance economic integration with heightened emphasis on increasing connectivity; enhancing economic competitiveness; and advancing a people-oriented, people-centred ASEAN through technology and innovation.

ASEAN has made significant efforts in strengthening inter-regional ties and deepening engagement with global partners. The signing of the Regional Comprehensive Economic Partnership (RCEP) in November 2020 established the world's largest free trade area, covering nearly 30% of the global gross domestic product (GDP) and population. This agreement is poised to reshape trade dynamics across the region by simplifying customs procedures, setting new standards for e-commerce, and bolstering supply chain linkages (Chen, 2016). ASEAN continues to attract significant foreign direct investment (FDI). According to ASEAN Investment Report (2021), FDI inflows to ASEAN surpassed US\$137 billion in 2020, despite the global economic downturn. This resilience underscores ASEAN's enduring attractiveness to foreign investment and demonstrates the region's potential to maintain a fast pace of development in the next decade.

Globally, digitalisation has triggered some fundamental social-economic changes that are wider, deeper, and less predictable than ever. In the 21st century, digitalisation is transforming the world economy into a better-connected, smarter, and more efficient system (Chen, 2023). Beyond its economic implications, digitalisation is driving social transformation by reshaping the ways people connect and interact (Chen and Kimura, 2019). Despite the recessionary drag from the pandemic, digital

solutions have effectively supported government measures to limit mobility, whilst enabling people and businesses to grasp new market opportunities. From 2017 to 2021, global e-commerce revenue doubled. By the end of 2023, annual global e-commerce revenue reached US\$3.6 trillion (Statista, 2024).

ASEAN and East Asia now host the world's fastest-growing online market. By 2018, half of ASEAN's 680 million population had used digital payments to purchase goods and services, representing a market valued at US\$72 billion with an average annual growth rate of 25%–35% projected from 2018 to 2028 (Google and Temasek, 2019). Statista (2024) forecasts that from 2025 to 2030, ASEAN's average annual growth in e-commerce revenue relative to regional GDP will be twice the global ratio of e-commerce to GDP growth. This positions ASEAN to leverage digital technology and sustainable practices to empower Factory Asia and further unleash its potential for development.

The ASEAN policy landscape underscores the strategic importance of digitalisation in regional development. The AEC Blueprint 2025 and the ASEAN Socio-Cultural Community (ASCC) Blueprint 2025 highlight the integration of digitalisation into ASEAN regional development goals (ASEAN Secretariat, 2015, 2016). The ASEAN Digital Integration Framework Action Plan further outlines policy priorities such as expanding connectivity and enhancing regulatory frameworks to foster a digital-friendly environment that supports economic growth and innovation. As Intal and Chen (2017) argued, ASEAN's pursuit of a highly integrated and cohesive economy aims not only to position ASEAN at the forefront of Asian regionalism but also to enhance the overall competitiveness of the broader Asian economy on the global stage.

This chapter explains why ASEAN should prioritise digital transformation as a key regional development strategy in the post-2025 era. It discusses the challenges facing ASEAN and suggests that the region address these by accelerating digitalisation and deepening market integration. The rest of the chapters are organised as follows. Section 2 explores the formation of Factory Asia, showing its importance in global value chains (GVCs) and regional development. Section 3 illustrates how the digital revolution is transforming GVCs, elevating them to a new stage. Section 4 provides policy suggestions for empowering Factory Asia through digitalisation to achieve sustainable economic prosperity over the next decade.

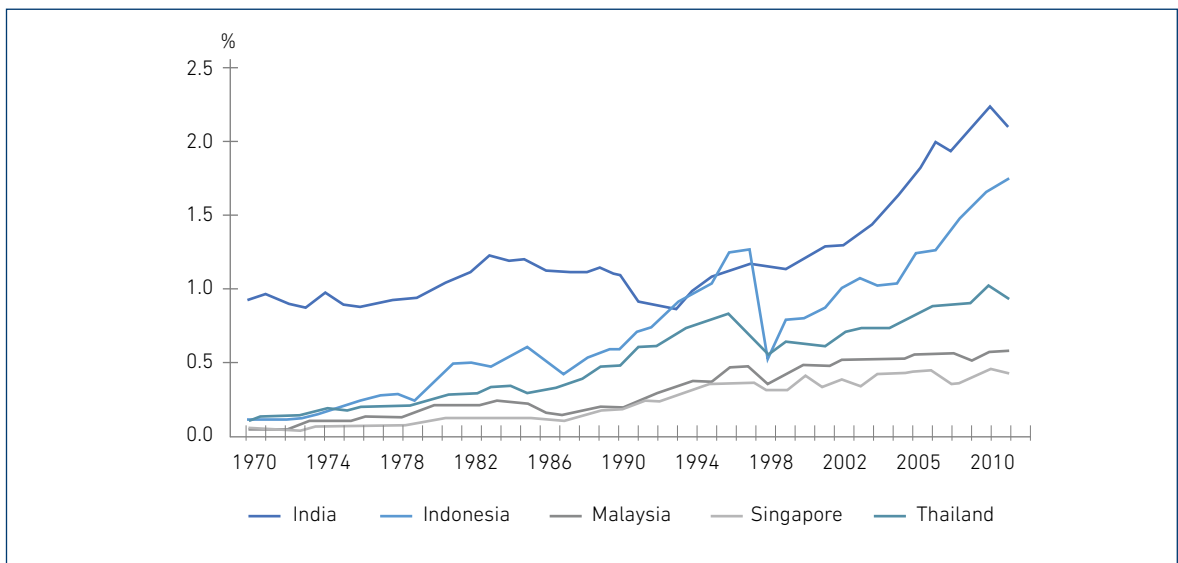
2. ASEAN as a Hub in Factory Asia

Globalisation in the second half of the 20th century diverged significantly from its 19th-century predecessor by widening the spectrum of goods and services entering international trade. This shift was driven by the fragmentation, unbundling, and offshoring of production processes. Unlike traditional integrated production patterns, fragmented production technologies allow discrete stages of production to be geographically distributed (Jones and Kierzkowski, 1990, 1998; Baldwin, 2007; Chen et al., 2017). This segmentation enables competitiveness to be assessed at the sub-stage of production rather than across an entire production chain. As a result, the characteristics and productivity of various labour categories can be more clearly defined, fostering a finer division of labour. This dynamic has underpinned the rise of global production sharing, in which trade and investments are increasingly organised within GVCs.

The development of an intensive regional production-sharing network is one of the core characteristics of the 'Asian way' of economic integration (Chen, 2007). This approach has fuelled what is often referred to as the 'East Asian miracle', where certain Asian economies achieved within a few decades levels of industrialisation that had taken advanced economies over a century to attain. Baldwin (2005) credits such success to the integrated network of production and supply chains across Asia – dubbed Factory Asia – characterised by multilayered networks interconnected by intensive cross-border production-sharing activities.¹

Within Factory Asia, ASEAN has established itself as a central hub, working symbiotically with East Asian economies. Manufacturing processes are internationally fragmented and shared amongst countries, leveraging their comparative advantages. This cooperative competition for outsourced tasks from advanced economies has fostered unilateral trade liberalisation and spurred regional integration across East Asia. ASEAN's evolution illustrates how deepening intra-regional connections and advancing economic globalisation can be mutually reinforcing (Chen and De Lombaerde, 2019). In addition to their commitment to community-building initiatives – such as the AEC, the ASSC, and the ASEAN Political Security Community – ASEAN Member States (AMS) have actively promoted trade liberalisation through multilateral and bilateral agreements. Initiatives such as the RCEP and various legal mechanisms for regional integration² have fostered cross-border economic interactions and coordination. This integrated approach has enabled ASEAN to function as a unified production base and an 'export platform' within the global economy. For instance, ASEAN's share of global manufacturing value has been increasing over time (Figure 4.1).

Figure 4.1. Manufacturing Value Added as Shares of Global Value Added



Source: Asian Development Bank (2013).

¹ Factory Asia evolved from the concept of 'wild-geese-flying' pattern, as envisioned by Akamatsu (1962) and Kojima (1970), which described the region-wide process of sequential industrialisation.

² Although ASEAN integration followed a top-down approach, the treaties and agreements amongst AMSs were either non-binding or, when binding, lacked a practical and effective mechanism for monitoring and enforcement (Chen and De Lombaerde, 2019).

ASEAN's development since the mid-20th century can be understood as the joint outcome of globalisation and regional integration. The evolution of Factory Asia occurred in dynamic markets shaped by the interplay of globalisation and the strengthening of economic linkages between economies. Factory Asia's structure was shaped by the principles of open regionalism, which ensured sustained economic integration and cooperation through non-discriminatory, transparent, and mutually beneficial policy, as Drysdale (1988) insightfully pointed out.

ASEAN's economy has become a critical link in GVCs. Over time, its strength has expanded beyond lower-end manufacturing to include high-tech products and services, attracting multinational corporations looking to leverage global competitiveness by outsourcing production activities to the region.

Factory Asia's performance is largely determined not only by global demand but also by the supply of high-tech inputs from the West, mainly via the exchange of parts and components, which are critical to its overall export capacity (Chen and Kimura, 2019). This deep interdependence with the world economy is, however, a double-edged sword. On the one hand, it provides the external circumstances necessary for successful export-driven growth. On the other hand, it exposes Asian economies to vulnerabilities during economic crises, trade tensions, or global disruptions such as the coronavirus disease (COVID-19) pandemic. For advanced economies such as Japan, these risks are mainly demand-driven. In contrast, for China and developing ASEAN countries, which remain competitive in labour-intensive activities, vulnerabilities stem from both the demand and the supply sides of the equation.³

3. Digitalisation as a New Driver of Global Value Chains

Baldwin (2016) divides the progression of technological innovation and economic globalisation since the 18th century into four distinct stages,⁴ showing how this evolution gave birth to international trade and nurtured its development. Throughout these stages, technological progress has consistently reduced costs, enabling finer levels of economic specialisation. Alongside globalisation, new technologies have facilitated an increasingly detailed international division of labour.

ASEAN's success is inextricably linked to the expansion of GVCs, which emerged during the era of the second unbundling. This expansion was driven by the international fragmentation of production, enabled by advancements in communication and information technology (ICT). The 20th century information revolution, which first saw the use of radio, television, satellites, and analogue office automation devices, later progressed to the use of personal computers, computer networks, and digital devices. These innovations significantly reduced transport and communication costs, making remote business administration more accessible and affordable. This technological progress revolutionised

³ The performance of Asian economies during the 2008–2009 crisis exposed Factory Asia's high level of vulnerability to external shocks. This vulnerability mainly originated from the passive position of the region in value chains due to its heavy reliance on foreign demand and technological inputs within the real economy (Chen and De Lombaerde, 2010).

⁴ The four stages are (i) the pre-globalisation world, (ii) the first unbundling (the separation of production and consumption), (iii) the second unbundling (the international fragmentation of production), and (iv) the third unbundling (further fragmentation of production tasks).

the organisation of international economic activities. Production, which was traditionally an integrated process, became fragmented, geographically dispersed, and interconnected through service links. These links enabled different stages of production to take place in various locations whilst remaining efficiently coordinated.

The second unbundling lowered the thresholds for joining the international division of labour, allowing more firms, especially small and medium-sized enterprises (SMEs), to benefit from global production sharing. For developing countries, participation in GVCs provides new thoughts on economic development. Trade and investment liberalisation became widely accepted, and the East Asian 'economic miracle' provided compelling evidence that economic openness and market integration facilitate access to global markets, driving prosperity. Service links, especially those in business and financial services that facilitate GVC coordination, have made great strides.

As a result, the world economy has become increasingly interconnected via GVCs, with more goods being traded and more countries participating in international trade. This is evident in the rapid growth of worldwide maritime trade, where transport volumes have nearly tripled from 4 billion tonnes in 1990 to over 11 billion tonnes in 2021. Asia, as the 'factory of the world', has remained the leader in maritime freight. According to the United Nations (UN) Trade and Development (2023), Asian ports account for over 40% of all goods loaded worldwide and handle almost two-thirds of total goods discharged worldwide.

Since its early development, the Factory Asia model has faced challenges, especially the need to upgrade technological capabilities and develop human capital within ASEAN. These challenges also present opportunities, motivating the region to move towards higher-value, technology-driven industries. The 21st century marked the onset of the third unbundling, which opened a new chapter in economic globalisation whilst continuing the trends triggered and promoted by the first and second unbundling. The second unbundling enabled and facilitated international production sharing, whilst the third unbundling focused on facilitating international idea sharing. Digital technologies⁵ are driving down trade costs across all dimensions, especially those associated with people-to-people connections. These advancements enable people separated by vast distances to share ideas and collaborate in real time via cyberspace.

The third unbundling extends and deepens GVCs. Digital solutions blur the boundaries between different stages of value chains, enabling firms to fragment tasks further across international borders whilst benefiting from the reduced cost of people-to-people connections. Digitalisation increases automation and makes supply chains 'smarter'. With data as the new oil, the adoption of digital technologies strengthens GVC efficiency by improving connectivity, increasing network transparency, and reducing vulnerabilities to external shocks.

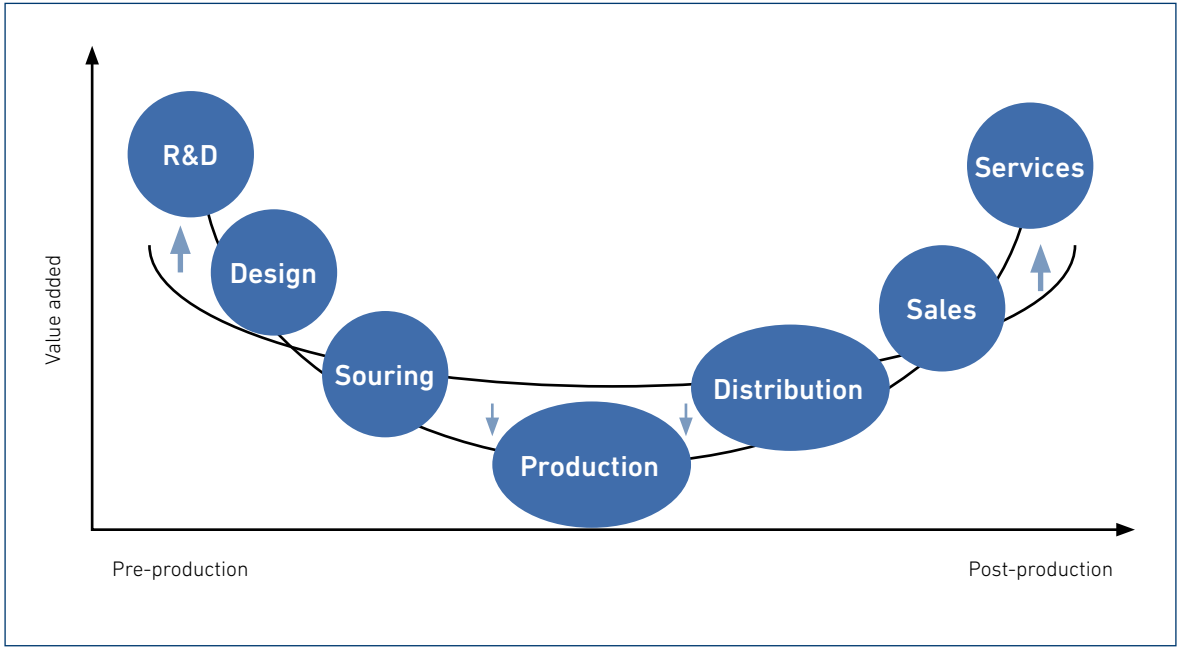
The application of digital technologies and related business models makes services much more innovative and productive. Digital-empowered service links, whether digitally enabled or digitally born, improve GVC coordination and drive network extension. For that reason, the overall efficiency of production is determined not only by the productivity of sub-stage production activities but also by the efficiency of service activities that link the value chains.

⁵ The use of SMACI technologies (social media, mobile apps, artificial intelligence, cloud computing, and Internet of Things) has further facilitated the movement of people, skills, and services.

These advancements have substantially lowered the barriers to international collaboration in innovation. Beyond manufacturing, research and development (R&D) and scientific activities now benefit from global sharing, as well. A prime example is the Human Genome Project (HGP), which shows how a large, well-organised, and highly collaborative international effort can achieve one of the most ambitious and important scientific endeavours in history.

The HGP aimed to comprehensively sequence the exact order of chemical base pairs that make up segments of DNA (deoxyribonucleic acid). Given that human genomic DNA is composed of 3 billion chemical base pairs, decoding its sequence initially seemed beyond the capacity of any single institute or country when the project was initiated in the 1990s. The key to the HGP's success was global sharing. The project assembled interdisciplinary groups from 20 universities and research centres across the United States, the United Kingdom, France, Germany, Japan, and China. Experts in engineering, biology, computer science, and other fields worked collectively to achieve the sequencing of the entire human genome by 2003. This success story highlights the significance of global R&D sharing in inspiring human creativity. As a result, R&D and service activities tend to generate higher value-added contributions, further accentuating the upward curve of the GVC 'smiling curve' (Figure 4.2).

Figure 4.2. GVC Smiling Curve



Source: Author.

The development of the digital economy relies heavily on support from GVCs. Integrating digital technologies into business operations creates opportunities for new products, services, and markets. Combining digital technology with innovations in materials and energy is widely recognised as a key to unlocking huge market potential. Estimates by the World Economic Forum and Kearney (2018) show that adopting Industry 4.0 in ASEAN could increase the region's overall productivity by more than US\$200 billion and increase revenue by over US\$40 billion.

It is worth noting that today's technologies – especially cutting-edge innovations with the most promising market prospects, such as artificial intelligence, autonomous vehicles, drones, cloud computing, inventory optimisation algorithms, and predictive analytics – are far more complex than ever. AI, for instance, is not a stand-alone technology but a set of systems that enable machines to perform human-like cognitive functions. These cover machine learning, rule-based reasoning algorithms,⁶ recognition technologies for communication, and embodiment technologies such as autonomous robotics and human augmentation, which allow machines to operate like humans. Such increasing technological complexity necessitates the expansion and deepening of GVCs. Collaborative approaches amongst firms and countries are essential to nurturing and advancing these developments.

The semiconductor industry serves as a prime example of such collaboration. As one of the most innovative sectors underpinning the rapid evolution of digital technologies, semiconductor chips represent some of the most complex products ever manufactured. It would be wrong to think that chips could be made by a single company or even a single country. Chip production depends on intricate value chains that weave through several specialised segments, including chip intellectual property (IP) cores, electronic design automation tools, specialised materials, manufacturers of wafer fab equipment, chip designers, and chip foundries. Each segment is highly specialised and innovation-intensive. Companies within these segments feed their innovations up the value chain, culminating in fabrication plants that transform the designs into physical semiconductor chips.⁷

The increasing complexity of technology necessitates global production sharing within each specialised segment. For example, the dual-stage extreme ultraviolet (EUV) lithography system, a machine essential for making high-end chips, is more structurally complex and requires more components than an Airbus aeroplane. Comprising over 400,000 highly specialised, technology-intensive parts and components, its production demands an intricate global supply chain. ASML, the world's leading innovator in photolithography equipment, relies on a network of more than 4,600 tier-one global suppliers to produce EUV systems. Even more impressive, ASML employs over 14,000 R&D specialists across 16 R&D innovation centres in several countries to support its advanced technological capabilities and drive product development efforts (Figure 4.3).

⁶ These guide the machine on how to think, including in areas such as decision-making, expert systems, knowledge representation, planning and scheduling, search and optimisation, and more.

⁷ Their joint efforts in innovation have reduced the size of a transistor that a chip can optimally feature, from 130 nanometres in 2001 to 3 nanometres in 2022.

Figure 4.3. ASML's Global Network of Production and Innovation

Source: Author.

This will have deep implications for the development of Factory Asia in the digital era. Digitalisation and globalisation enable organisations to tap into a global talent pool, collaborate with experts worldwide, and leverage diverse skills and perspectives. Open-source platforms and online learning provide broader access to the latest technology, allowing individuals and organisations to actively participate in innovation.⁸ These developments accelerate workforce reskilling and upskilling, fostering the creation of more innovative solutions and products. To capitalise on this potential, Factory Asia must prioritise empowering its workforce through digitalisation.

4. Post-2025 Digital ASEAN

Digitalisation is reshaping the innovation landscape in the post-2025 era, making it faster, more collaborative, and more data-driven. Innovation is becoming a globally shared endeavour, and GVCs are evolving into ecosystems that are better connected, smarter, and more efficient (Chen, 2021). For ASEAN, a key priority in its post-2025 agenda should be strengthening regional competitiveness within GVCs by leveraging digitalisation. Policies must focus on integrating digital technologies, such as big data, cloud computing, and AI analytics, into R&D activities to speed up prototyping, testing, and iteration of new technologies.

⁸ Digital platforms, such as Apple's App Store and Google Play, provide a framework for third-party developers to create innovative applications and services, thereby expanding the ecosystem.

To keep ASEAN competitive in the digital economy – also known as the ‘creative economy’ or the ‘innovative economy’ – supporting innovative economic growth should stay at the core of regional development strategies. Despite their negative effects on regional development, the development gaps across AMSs and the coexistence of various patterns of economic unbundling can provide policymakers greater flexibility and an expanded policy space. Policymakers must design strategies that take into account global tendencies and regional or sector-specific conditions, balancing sequential economic upgrades and leapfrogging strategies for deeper integration into GVCs (Kimura and Chen, 2018). Integrating new technologies into traditional economic sectors can polish their competitive edge in the new economy.

To empower Factory Asia through digitalisation, ASEAN must prioritise policy efforts that support market-driven forces, with a focus on improving people-to-people connections as a core principle of decision-making. Digitalisation plays a pivotal role in this transformation, marking the third unbundling of economic globalisation. The market is poised to reward products or services that align with this global trend and actively facilitate people-to-people connections. More importantly, digital transformation extends beyond economic changes, representing a profound shift in how people live, work, and study. It is not merely an economic transformation but a social one as well. ASEAN should highlight the improvement of people-to-people connections as a cornerstone of post-2025 regional community-building, recognising digitalisation’s important implications for Asia’s development. The next Asian growth miracle could emerge from the digital transformation of Factory Asia into a new era (Chen, 2021). To accelerate this process, ASEAN must commit to sustained efforts to improve digital connectivity and establish robust digital trade rules.

4.1. Improving Digital Connectivity

Connectivity remains at the core of GVCs’ digitalisation. Factory Asia was built upon a well-connected regional production-sharing network and, in the digital era, effective connectivity requires more than just robust logistics and infrastructure to facilitate trade and the movement of factors. It also requires secure and efficient cyberspace connections to support seamless communication and information exchange. ASEAN must overcome difficulties arising from development gaps, including cross-border and urban–rural disparities, as well as constraints stemming from a lack of capital, skilled labour, and technological expertise.

Efforts to improve digital connectivity in the post-2025 ASEAN framework should be consistent with the three strategic pillars⁹ defined in the 2011–2015 master plan on connectivity and the five groups of strategic objectives¹⁰ specified in the Master Plan on ASEAN Connectivity 2025. However, these efforts must place greater emphasis on the significance of digital elements. Improving service quality to upgrade connection networks¹¹ is as important as building new infrastructure. Beyond ongoing investments in logistics and infrastructure, ASEAN should prioritise the development of connectivity-

⁹ The three strategic pillars are physical connectivity, institutional connectivity, and people-to-people connectivity (ASEAN, 2010).

¹⁰ The five groups of strategic objectives are sustainable infrastructure, digital innovation, seamless logistics, regulatory excellence, and people mobility (ASEAN, 2017).

¹¹ Quality as measured based on speed, accuracy, transparency, reliability, and resilience.

related services to meet market demands for near-sourcing, omnichannel solutions, and faster transport options (Inbound Logistics, 2014). This dual approach – increasing network efficiency and meeting market needs – can simultaneously increase the utilisation and effectiveness of connection networks, generate jobs, and create more business prospects for micro, small, and medium-sized enterprises.

The adoption of digital solutions has already strengthened regional connectivity and delivered significant benefits for ASEAN's development over the past decade. The widespread use of smartphones, e-payment systems, and mobile applications has made internet access more accessible. According to Google and Temasek (2019), 90% of Southeast Asians use smartphones as their primary gateway to accessing information, social media, messaging platforms, and entertainment such as music and videos. Similarly, e-payment solutions have overcome obstacles posed by traditional banking networks, increasing financial inclusivity and enabling greater access to financial services. To accelerate digital transformation, prioritising the improvement of data connectivity is essential. A seamless flow of information, data, and ideas across various platforms, devices, and networks enables real-time collaboration, data sharing, and the integration of various technologies and systems, regardless of geographical location.

However, a bigger challenge lies in reaching an international consensus to realise the free flow of data with trust amongst countries. This issue has deep implications for the performance of Factory Asia in the digital era. On one hand, advancements in technology, such as the widespread use of smartphones, the internet, and technologies that facilitate data collection, processing, storage, and distribution, have eliminated many technical barriers to data flow. Today, much of the data is digital-born, inherently borderless, with its life cycle existing entirely in cyberspace.

On the other hand, the concept of 'trust' raises critical concerns about data accuracy, safety, and privacy protection. Whilst advancements in ICT facilitate broader use of data, they also increase risks such as data breaches, theft, or misuse. The free flow of data must be safeguarded by robust policy frameworks, especially as data increasingly becomes the main carrier of value.

Chen et al. (2019) propose a policy framework in which the free flow of data serves as a logical benchmark and is supported by the following measures: (i) policies for liberalisation and facilitation, (ii) policies to correct or mitigate market failures,¹² (iii) policies to reconcile social values and concerns with economic efficiency, (iv) policies to integrate data flows and data-related businesses into domestic policy regimes, and (v) strategic trade and investment policies (Figure 4.4). As Chen and Kimura (2019) point out, the overall efficiency of digital connectivity is determined by three key factors: the efficiency of physical connectivity, the robustness of connectivity within cyberspace, and the seamless integration between cyberspace and the physical parts of the network.

¹² In a data-driven economy, potential market failures may arise from network externalities, economies of scale, information asymmetry, or a combination of these factors.

Figure 4.4. Free Flow of Data with Trust Supporting Policy

Source: Chen et al. (2019).

4.2. Digital Trade Rule Setting

Despite the variety in definitions of digital trade provided by governments and organisations, international rule setting should build on a common understanding of digital trade governance. First, digital trade involves the trade of goods and trade of services. Digital solutions have shown their capacity to facilitate the transaction of materials, products, and capital, whilst digitalisation has transformed many previously non-tradable sectors into tradable ones.

Second, digitalisation has sharpened the competitive edge of data-driven business models. The delivery of an end product no longer marks the conclusion of a sale but represents a milestone leading to ongoing producer–consumer interactions (Chen, 2019). For that reason, cross-border data flows are a critical component of free trade. These flows facilitate other forms of trade, ranging from goods and services to international factor mobility, and enable the emergence of more efficient trade forms as new technologies develop.

Third, digital solutions create new sources of value-added for businesses. Accordingly, rules governing digital trade should address governing the whole GVC, including the trade of intermediate products and the service activities interwoven throughout production networks. This is particularly important as digitally enabled communication methods expand the coverage and depth of GVCs.

Fourth, digital trade is not solely a trade issue but a critical element of development and economic integration, especially in the context of the green economy, sustainability, and inclusive growth. Promoting digital trade calls for a broader regulatory framework addressing a wide range of related issues. The Group of Twenty (G20) Trade and Investment Working Group has identified the potential impact of digital trade across five domains: (i) market access, (ii) trade facilitation, (iii) data flow-related issues, (iv) competition, and (v) development impact. Table 4.1 categorises policies to mitigate digital trade barriers into four groups.

Table 4.1. Policies to Mitigate Digital Trade Barriers

Policy category	Issues
'Conventional' trade issues	Tariff, non-tariff measures (NTMs), trade facilitation, connectivity, dispute settlement mechanisms, etc.
Digital service trade	Digital taxation, intellectual property rights, business registration and licensing, competition law and regulation, border measures, labour movement, minimum service requirements, etc.
Free flow of data	Data governance, privacy protection, trust building, cybersecurity, etc.
Regulatory framework of digital trade	Interoperability, standardisation, industrial policy, domestic reform, etc.

Source: Compiled from Chen (2019).

4.2.1. 'Conventional' Trade Issues

The largest category of trade challenges contains 'conventional' issues affecting trade in goods and services. In many respects, international trade in the digital era is still subject to barriers that hindered free trade in the 20th century. Whilst these measures are generally referred to as 'conventional', digitalisation adds new complexities and elements that warrant further policy consideration.

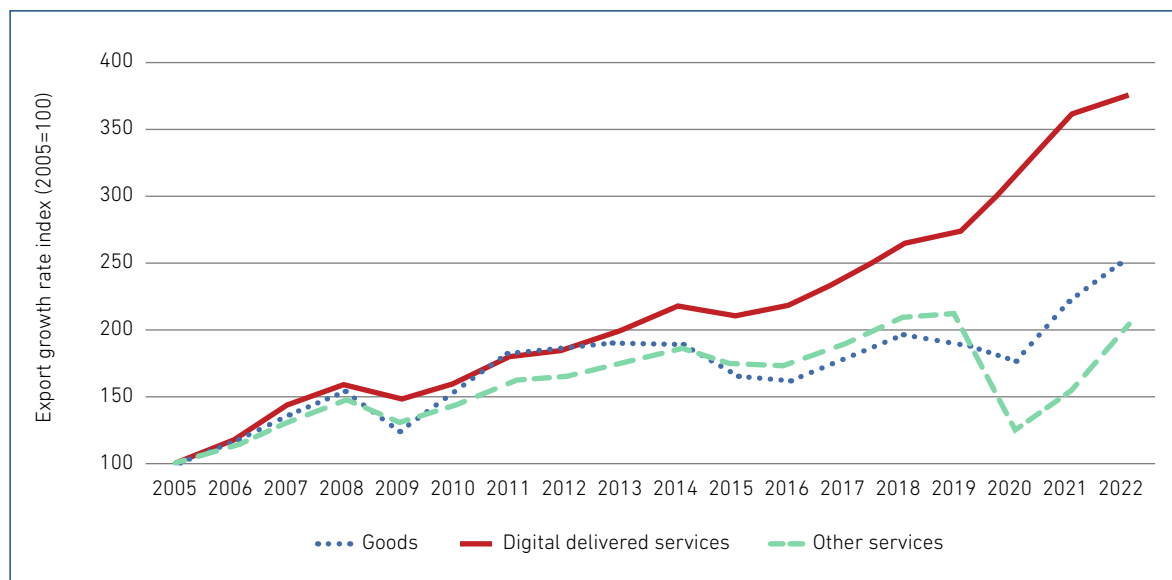
For example, with the fast growth of online markets and cross-border e-commerce, the 1998 World Trade Organization (WTO) Ministerial Declaration on Global Electronic Commerce and the 2019 moratorium on 'not imposing customs duties on electronic transmissions' have come under scrutiny. Tariffs on e-commerce have emerged as a contentious issue in the WTO's ministerial conferences. Although the literature on international trade illustrates that free trade benefits all parties, the advent of digital marketplaces has exposed mismatched paces of trade liberalisation between online and offline markets. This divergence can create regulatory gaps and distort fair competition. Indeed, measures restricting the liberalisation of the service sector and labour mobility in the physical world similarly hinder trade and factor mobility in cyberspace.

Wu (2017) points out that non-tariff measures (NTMs) associated with traditional trade can extend into digital trade, creating discretionary patterns that favour certain local players. Digitalisation can facilitate the emergence of new NTMs due to the growing complexity of global and investment networks or the use of digital means in policy design (Chen and Rillo, 2024). Administrative measures for digital products or services, such as technical standards for digital goods or quality inspection for digital services, may create technical barriers that restrict market access. Whilst these measures can yield long-term benefits, such as improved consumer or environmental protection, they can also impede trade in the short term.

Given the complexity of NTMs, the Asia-Pacific Economic Cooperation (APEC) (2018) suggested seven principles to mitigate their possible trade-restrictive effect. First, the application of NTMs and their procedures should be transparent to users. Second, the use of NTMs should lead to predictable and coherent outcomes. Third, NTMs must align with multilateral commitments and obligations, based on relevant and non-discriminatory international standards. Fourth, NTMs should be based on global standards. Fifth, NTMs must not favour specific players or discriminate unfairly. Sixth, NTMs should be limited in scope, targeting only precise and legitimate objectives. Finally, NTMs must not create unwarranted barriers to technological progress and innovation. ASEAN should incorporate these principles into its post-2025 initiatives to facilitate trade within the Factory Asia framework.

4.2.2. Digital Service Trade

The development of the service sector is crucial to unleashing the full potential of the digital economy. Digitalisation introduces new sources of value-added for businesses by facilitating the servicification of manufacturing activities. (Chen, 2023). As a result, a significant share of digital trade comprises trade in services, and many service-related trade issues have already been included in negotiations aimed at liberalising trade in services. A joint study by the World Bank, the WTO, the Organisation for Economic Co-operation and Development (OECD), and the UN shows that global exports of digitally deliverable services have been growing steadily, outpacing the growth of goods and other service exports (Figure 4.5).

Figure 4.5. Global Exports of Digitally Deliverable Services

Source: World Bank, World Trade Organization, Organisation for Economic Co-operation and Development, and United Nations (2023).

Given the importance of GVCs in the Asian economy, intellectual property rights (IPR) within the service sector should be prioritised as a key factor in attracting foreign investment and facilitating technology diffusion. Effective IP protection has become a de facto prerequisite for countries seeking to get involved in GVCs. Therefore, ASEAN must enhance its focus on strengthening IPR protections to promote cross-border technology transfer and innovation.

According to WTO statistics, IP-related services¹³ accounted for one-eighth of digitally delivered services exports in 2022. This was surpassed only by business, professional, and technical services (40%), computer services (20%), and financial services (16%) (WTO, 2023), showing the increasing importance of IPR in international trade in services. Addressing IPR-related trade barriers requires equal treatment of online violations, such as copyright and trademark infringements, on par with offline infringements. However, from the perspective of developing countries, a more important consideration in trade negotiations involving IP-related provisions should be to ensure that IP protection can subsequently contribute to technology transfer and innovation. It is essential to tailor protection strategies to meet the specific needs and schedules of latecomers, including the provision of targeted technical assistance.

¹³ IP-related services encompass a range of activities designed at helping individuals and organisations in protecting, managing, and leveraging their IPR. These services are crucial for navigating the complexities of IPR law and ensuring that creators and innovators can fully benefit from their intellectual efforts and investments.

4.2.3. Free Flow of Data

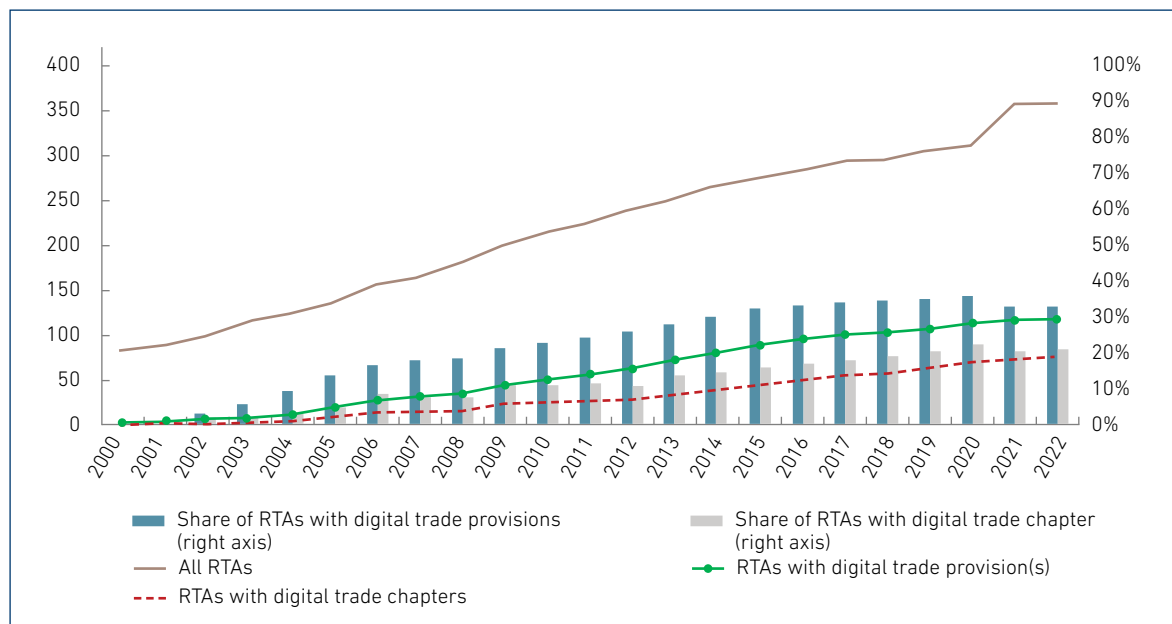
Compared to conventional sources of trade barriers, policy measures governing cross-border data flows are a topic of hot debate. The value and power of data in the digital economy cannot be overstated. From an economic point of view, any restrictions on the free flow of data cause losses in economic efficiency. For instance, data localisation requirements pose barriers for firms relying on big data and cloud computing for decision-making, lowering operational efficiency. Similarly, policies such as filtering, blocking, or impeding internet access distort markets and increase cross-border transaction costs, much like NTMs affect traditional international trade. The freer the flow of data, the higher the potential economic gains. Cross-border data transfers are subject to different privacy and data regulations across countries, creating challenges in balancing the need for unrestricted data flows to facilitate digital trade with the legitimate privacy and security concerns of individuals and nations.

ASEAN's post-2025 development strategy should prioritise trust-building and cybersecurity, framing the concept of 'free flow of data with trust' as a critical aspect of digital connectivity backed up by a supporting policy package.

One key focus should be international cooperation to improve data security and harmonise privacy legislation, as trust is fundamental to ensuring the smooth flow of data. Cyber threats and cybercrime, especially when orchestrated transnationally, can severely distort markets by disrupting business operations and supply chains. Despite their significant impact, there is still no comprehensive international legal framework to regulate transnational cybercrime and cyber fraud. In its post-2025 plan, ASEAN leaders must address these barriers by adopting a dual approach: develop international security standards or cross-compliance recognition frameworks for the design, architecture, and certification of critical infrastructure to ensure the safety and reliability of data flows; and through international cooperation, promote international norms of behaviour in cyberspace and intensify efforts to combat cybercrime. This involves a higher level of collaboration to strengthen data security and align cybersecurity practices.

4.2.4. Regulatory Framework of Digital Trade

It is recommended that AMS adopt a systematic approach to establish a comprehensive framework for facilitating digital trade whilst ensuring a rule-based competitive environment for the digital economy. In addition to multilateralism, negotiations on digital trade governance have increasingly taken place within bilateral and regional trade agreements. As of 2022, there were 116 such agreements containing digital trade provisions, representing 33% of all agreements notified to the WTO (Figure 4.6). These agreements cover a range of cross-cutting issues, including digital trade facilitation, privacy and data protection, consumer protection, source code regulations, customs duties on electronic transmissions, and cybersecurity collaboration to strengthen data security and align cybersecurity practices.

Figure 4.6. Regional Trade Agreements Containing Digital Trade Provisions

RTA = regional trade agreement.

Source: World Trade Organization (2023).

In Asia, Chapter 11 of the RCEP and Chapter 18 of the Comprehensive and Progressive Agreement for the Trans-Pacific Partnership (CPTPP) include provisions to facilitate cross-border e-commerce. When this chapter was being drafted, ASEAN was developing the Digital Economy Framework Agreement (DEFA), which seeks to establish a regulatory framework for digital trade. According to BCG (2023), DEFA negotiations will cover critical areas such as digital trade, cross-border e-commerce, digital payments, digital ID and authentication, online safety and cybersecurity, cross-border data flows and data protection, competition policy, talent mobility and cooperation, and regional cooperation on emerging issues.

To transform DEFA into a regional blueprint for development in the digital era, ASEAN must ensure interoperability between its regional rules and those of other parts of the world. This can be achieved by integrating guidance, such as the OECD's Going Digital Integrated Policy Framework, into regional policy design. Table 4.2 summarises the key elements of the framework.

Table 4.2. Summary of the Organisation for Economic Co-operation and Development's Going Digital Integrated Policy Framework

Policy Area	Notes
Access to communication infrastructure, services, and data	Policies addressing the availability and quality of digital infrastructure, such as broadband and mobile networks, internet access and affordability, and data management frameworks
Digital government	Adoption of digital technologies in public services, including e-government initiatives, digital public services, and citizen engagement
Digital skills and jobs	Efforts to improve workforce readiness, including digital literacy, skills development, and adaptation of the labour market to digitalisation
Trust in the digital environment	Ensuring trust and security in digital activities by addressing cybersecurity, data privacy, and consumer protection in the digital realm
Use of digital technologies	Promoting the adoption of digital technologies in business processes and fostering digital innovation
Market openness in the digital age	Improving the regulatory and policy environment for developing digital markets, including trade, competition, and investment in the digital sector
The broader impact of digital transformation on society and the economy	Policies addressing digital inclusion, the impact on well-being, and the digital divide

Source: Organisation for Economic Co-operation and Development (2020).

5. Conclusion

The internet and online activities have become an integral part of daily life. Online solutions have proven to be efficient substitutes for offline practices in many areas of society, from doing business to remote working and studying. These developments have driven significant shifts in attitudes towards digitalisation, both for institutions and individuals.

For Asia, accelerating digital transformation offers an opportunity to strengthen its position in GVCs and enhance its influence in global affairs. Achieving this requires an inclusive ecosystem supported by international norms to ensure a level playing field in the digital economy. The free flow of data is vital for 21st-century GVCs. However, this can only be realised through robust international rules and regulations that set clear boundaries for data use. It is important to bear in mind that digital solutions can either facilitate or hinder data flow and information sharing, depending on how they are applied. The biggest obstacle to global rule setting is not necessarily ideological and social-economic differences between countries but rather a lack of mutual trust. In the context of the 'free flow of data with trust', the concept of trust highlights concerns about data accuracy, safety, and privacy protection (Chen et al., 2019). Whilst advancements in ICT facilitate data usage, they also increase risks such as data breaches, theft, and misuse. Cross-border data flows are only feasible when trust amongst countries is established, backed by sound legal and regulatory frameworks.

Deepening regional integration with a focus on sustainability and the digital economy should stay at the core of ASEAN's post-2025 strategy of improving the global competitiveness of a more resilient and innovative Factory Asia. The region's achievements in integration provide a relatively high starting point for trust-building. For instance, the establishment of the RCEP facilitates integration by creating unified standards and reducing trade barriers amongst member countries and their partners. Similarly, ASEAN's bilateral dialogue mechanisms serve as platforms for sharing ideas and enhancing mutual understanding, paving the way for agreements that support the free flow of data with trust (Chen and Rillo, 2024). Whilst technological progress is the most important factor of digitalisation, other factors, such as changes in the global economic order, geopolitical shifts, and resulting social transformations, can influence or even alter its direction. Policymakers must account for these factors when making decisions.

To sustain its role in the post-2025 digitally empowered Factory Asia, ASEAN needs a full package of backup policies that comprehensively cover various areas of development. Improving digital connectivity and establishing robust regulatory frameworks for digital trade are crucial to creating a digital-friendly ecosystem that can facilitate the region's digital transformation and unleash its potential for sustainable growth.

A more pressing long-term challenge for ASEAN lies in nurturing talent. The success of Factory Asia hinges on a highly skilled labour force. Digital technologies must, first and foremost, serve human development. Like any other technological progress, digitalisation can drive social progress positively only when it empowers human productivity. The widespread use of social media and online learning platforms has made access to information both convenient and affordable. An open, trustworthy, and democratic cyberspace can further enable knowledge acquisition and foster human development. The advancement of human capital will, in turn, reinforce the progress of digital technologies. In the post-2025 era, education will still play a key role in developing human capital. To this end, ASEAN must focus on the following: (i) cultivating a spirit of innovation and entrepreneurship; (ii) integrating ICT training into school curricula; (iii) leveraging ICT to increase the efficiency of teaching and learning, and (iv) promoting non-formal education initiatives, such as technical and vocational education and training (TVET), as well as certification programmes for various industrial qualifications, whilst strengthening their links with formal education systems.

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Chapter 4

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This chapter should be cited as
Chen, L. (2025), 'ASEAN in the Post-2025 Digital Empowered Factory Asia', 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. 53-73.