Chapter 10

Regional Production Networks and Cross-Border Trade

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Regional Production Networks and Cross-Border Trade

Fukunari Kimura and Dionisius Narjoko

1. Introduction

The evolution of international production networks (IPNs) over the past two centuries represents one of the most significant transformations of the global economic landscape. This paper examines the complex dynamics of these networks through the theoretical lens of 'unbundling' developed by Baldwin (2016), whilst analysing their implications for economic integration and development strategies of the Association of Southeast Asian Nations (ASEAN). The analysis focuses on how technological advances have progressively reshaped global production patterns and economic relationships between developed and developing nations, with special attention to the emerging challenges of digital transformation and geo-economic fragmentation.

The conceptual framework of unbundling provides a sophisticated analytical tool for understanding the sequential transformation of international trade and production patterns. Three distinct phases of globalisation are identified, each characterised by the progressive reduction of specific constraints: trade costs (first unbundling), communication costs (second unbundling), and face-to-face costs (third unbundling). This framework allows us to examine how technological breakthroughs have systematically overcome geographical constraints, leading to increasingly complex forms of the international division of labour.

The analysis builds upon several theoretical foundations, including the fragmentation theory developed by Jones and Kierzkowski (1990) and the two-dimensional fragmentation framework of Ando and Kimura (2005). These complementary theoretical perspectives help to explain the mechanics of IPNs, particularly in the East Asian context, where the transformation from simple cross-border production sharing to sophisticated production networks has been most pronounced.

The analytical scope of this study encompasses both theoretical developments and empirical evidence, with particular attention to the challenges facing ASEAN economies beyond 2025. The interplay between digital transformation imperatives and emerging geo-economic challenges is discussed. This discussion is particularly relevant given the demonstrated resilience of East Asian production networks to various economic shocks, from the 1997 economic crisis to the coronavirus disease (COVID-19) crisis in 2020–2021.

This paper is structured as follows. Section 2 presents the analytical framework for understanding IPNs, including the unbundling concept and spatial economics considerations. Section 3 examines empirical evidence from East Asian production networks, focusing on network widening, deepening, and resilience. Section 4 analyses the implications of digital technology and the third unbundling for global value chains (GVCs). Finally, section 5 discusses policy implications for the ASEAN Economic Community (AEC) post 2025, with particular attention to institutional adaptation and strategic responses to emerging challenges.

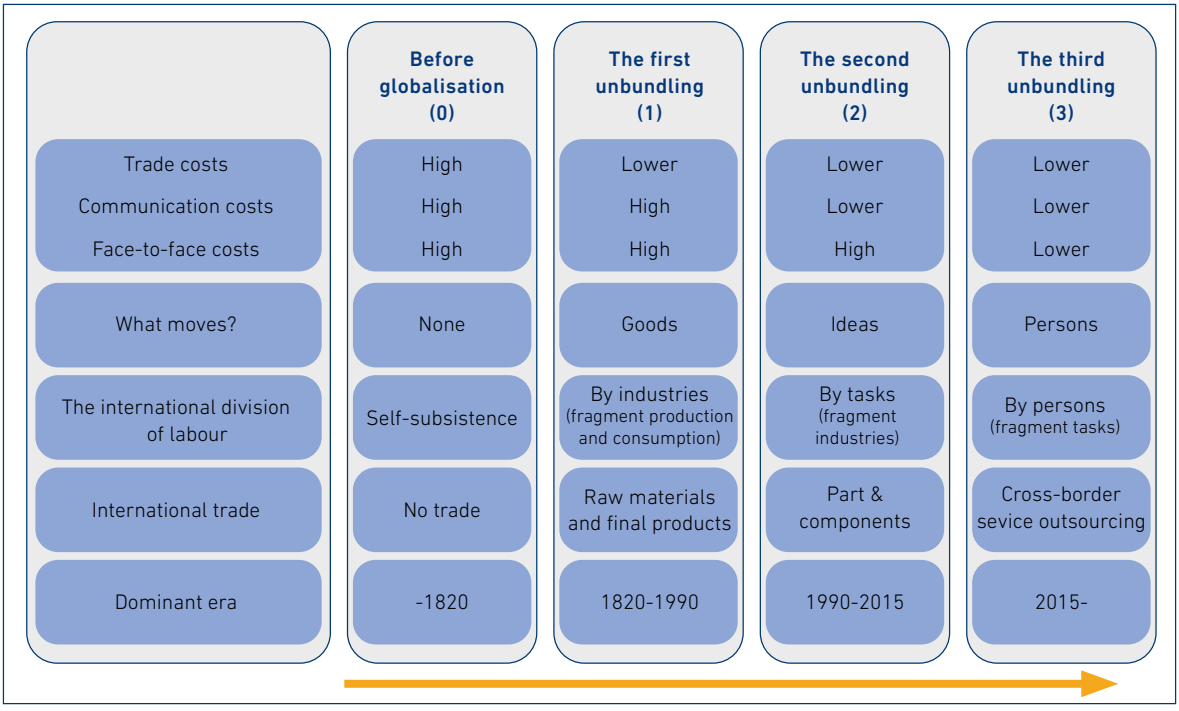
2. Analytical Framework for IPNs

2.1. Unbundling Concept

The international division of labour has undergone significant transformations over the past two centuries, driven by technological breakthroughs that have progressively overcome geographical constraints. This evolution can be effectively analysed through Baldwin's framework of 'unbundling' (Baldwin, 2016), which provides a comprehensive understanding of how technological advances have reshaped global production patterns and economic relationships between developed and developing nations.

As illustrated in Figure 10.1, the concept of unbundling is fundamentally tied to three types of costs: trade costs, communication costs, and face-to-face costs. Each reduction in these costs has triggered a new phase of globalisation, leading to distinct forms of the international division of labour. The first major transformation occurred in the early 19th century with the transport revolution, characterised by the introduction of steam ships and railroads. This development substantially reduced trade costs and enabled the 'first unbundling', where production and consumption could be separated across national borders. During this period, international trade primarily consisted of raw materials and finished products, with the international division of labour organised along industry lines based on comparative advantage.

Figure 10.1. Overcoming Distance and Unbundling à la Baldwin (2016)

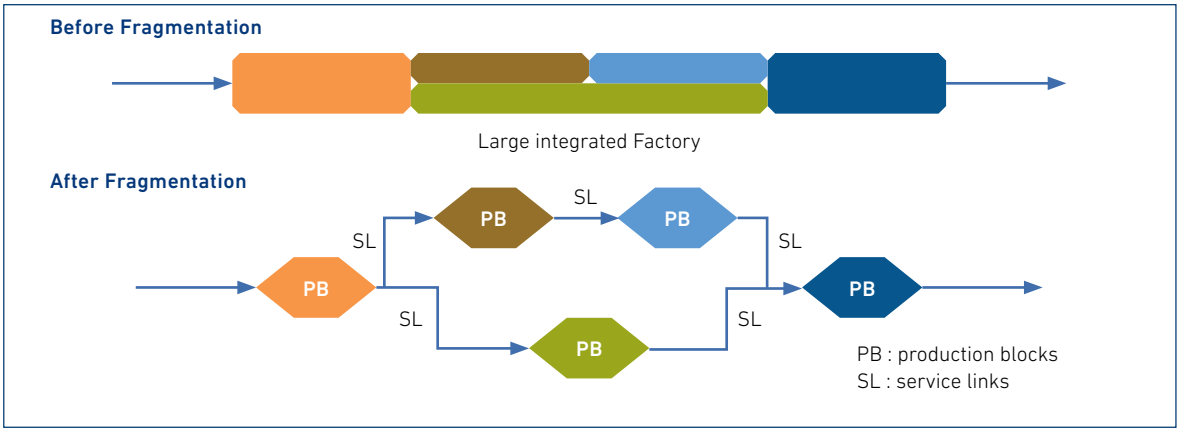


Source: Authors.

A more profound transformation began around 1990 with the information and communication technology (ICT) revolution. This technological breakthrough significantly reduced communication costs, making ideas mobile across countries and enabling what Baldwin termed the 'second unbundling'. This phase is characterised by the fragmentation of production activities into distinct processes or tasks, leading to a task-wise international division of labour. The most visible manifestation of this transformation has been the dramatic increase in trade of parts and intermediate inputs, which now constitute a substantial portion of international trade.

The concept of unbundling builds upon several important theoretical frameworks that help explain the mechanics of IPNs, particularly in the East Asian context. One crucial theoretical foundation is the fragmentation theory developed by Jones and Kierzkowski (1990), which directly preceded the concept of the second unbundling. As depicted in Figure 10.2, the fragmentation theory explains how an integrated production facility, typically located in a developed country, can be decomposed into separate production blocks positioned in different locations to optimise overall production costs. For this fragmentation to be economically viable, the differences in location advantages must be substantial enough to justify the relocation of production blocks, whilst the service link costs required to connect these dispersed production blocks must remain manageable.

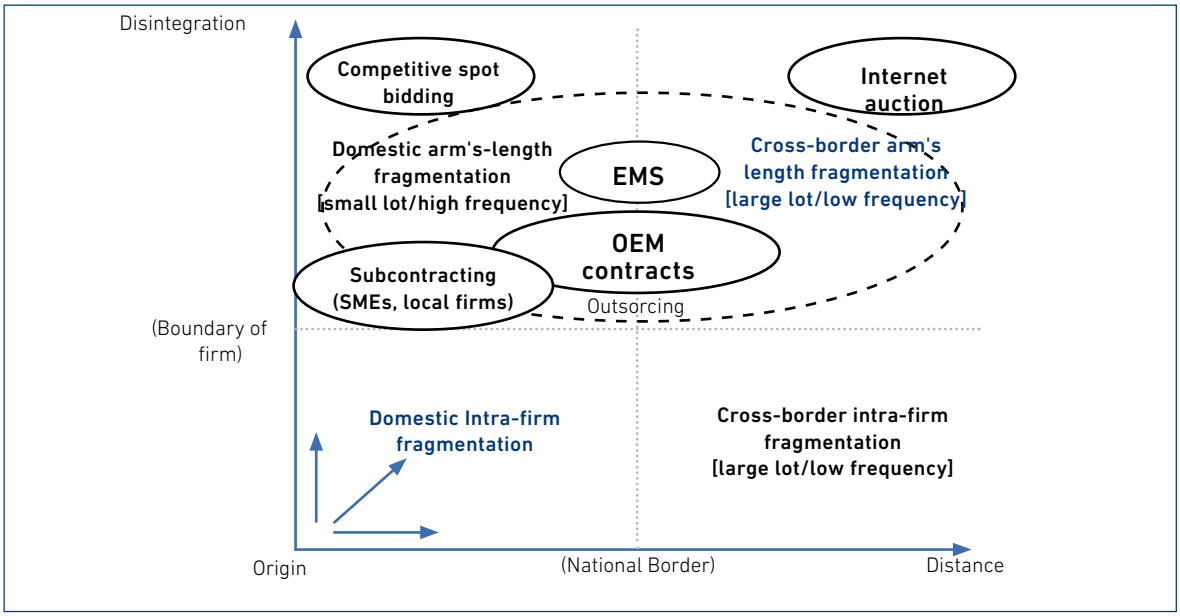
Figure 10.2. Fragmentation Theory



Source: Authors.

The theory of two-dimensional fragmentation (Ando and Kimura, 2005) extends this framework by considering both geographical distance and organisational boundaries. As shown in Figure 10.3, fragmentation occurs along two axes: geographical distance and the degree of firm disintegration. This theoretical framework reveals that transactions over short distances tend to be arm's-length, whilst long-distance transactions are predominantly intra-firm. This pattern has important implications for industrial agglomeration in developing countries, particularly for small and medium-sized enterprises (SMEs) engaging in IPNs.

Figure 10.3. Two-Dimensional Fragmentation and Industrial Agglomeration



EMS = electronics manufacturing services, OEM = original equipment manufacturer, SMEs = small and medium-sized enterprises.

Source: Ando and Kimura (2005), modified by authors.

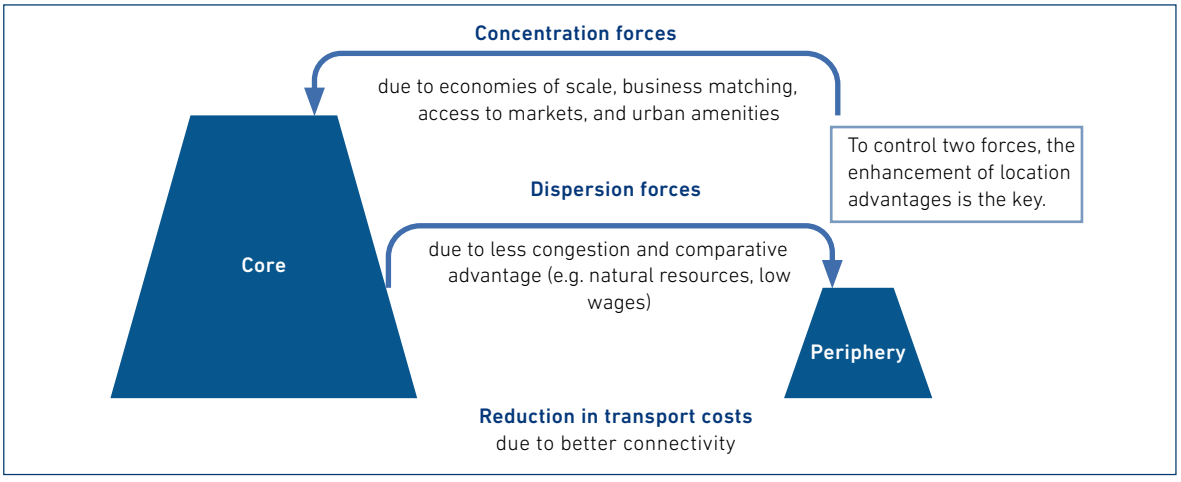
The two-dimensional nature of this framework provides crucial insights into the complexity of production network formation. In the geographical dimension, firms must balance the potential benefits of accessing different location advantages against increased transaction costs when production blocks cross national borders. These location advantages might include lower wages, access to specific skills or resources, or proximity to markets. However, the associated costs encompass not only physical transportation but also coordination challenges, regulatory compliance, and risks related to international operations. The disintegration dimension, meanwhile, involves decisions about maintaining activities within firm boundaries versus outsourcing to external parties. This choice often depends on factors such as transaction frequency, asset specificity, and the strategic importance of particular production processes.

The interaction between these two dimensions creates distinct patterns in production networks. For instance, when both geographical and organisational distances are short, transactions often involve local suppliers and customers in industrial agglomerations, characterised by frequent, small-lot deliveries and intense information exchange. These relationships are particularly important for SMEs and local firms in developing countries, as they provide entry points into broader production networks. Conversely, long-distance, cross-border transactions tend to be internalised within multinational corporations, especially when they involve core technologies or critical components. This reflects the higher coordination costs and risks associated with arm's-length transactions over greater distances.

2.2. Spatial Economics and Development Strategy

The new economic geography framework (Fujita, Krugman, and Venables, 1999; Baldwin et al., 2003) provides additional insights into the spatial dynamics of economic development. As illustrated in Figure 10.4, when transport costs between core and periphery regions decrease, both concentration and dispersion forces come into play. Whilst traditional theory suggests that reduced transport costs lead to the concentration of economic activities in the core, the presence of wage differentials and resource endowments in developing countries can strengthen dispersion forces, potentially attracting production blocks from developed nations.

Figure 10.4. The Core–Periphery Structure and Reduction in Transport Costs



Source: Authors.

The interplay between concentration and dispersion forces creates complex dynamics in regional development, particularly in the context of emerging economies. Concentration forces emerge from economies of scale, enhanced business matching opportunities, better market access, and urban amenities. These forces tend to reinforce the advantages of established economic centres, making it challenging for peripheral regions to compete. However, dispersion forces, driven by factors such as lower wages, reduced congestion, and access to natural resources, can create opportunities for peripheral regions to attract certain production activities.

The framework's application to development strategy is particularly relevant in the context of regional economic corridors and special economic zones. For instance, in the Mekong Subregion, the relationship between the Bangkok Metropolitan Area as a core and Cambodia's rural areas as a periphery presents specific policy challenges. The development of Phnom Penh as an intermediate city raises questions about optimal strategies for attracting both production blocks and labour. This involves careful consideration of infrastructure development, institutional quality, and human capital development to enhance location advantages whilst managing the potentially disruptive effects of rapid urbanisation.

The management of spatial economic development also requires consideration of different development models. One approach focuses on creating strong urban centres that can serve as growth poles, leveraging concentration forces to build competitive advantages in specific industries or services. This model recognises that some degree of geographic concentration may be necessary to achieve the scale economies and agglomeration benefits that make a location attractive for IPNs. Alternative approaches emphasise distributed development, attempting to spread economic activities more evenly across regions through targeted infrastructure investment and policy incentives.

These theoretical insights have practical implications for regional development policies. Policymakers must consider the optimal balance between promoting urban agglomeration and supporting rural development. This involves decisions about infrastructure investment, education and training programmes, and industrial policy. For example, the development of transport corridors can either reinforce concentration in existing centres or create opportunities for new economic nodes, depending on complementary policies and institutions. The success of such initiatives often depends on the ability to create self-reinforcing cycles of investment and development whilst managing negative externalities such as congestion and environmental degradation.

Furthermore, the framework helps inform strategies for achieving inclusive growth across different geographical scales. At the national level, it raises questions about the optimal distribution of economic activities between primary and secondary cities. At the regional level, it informs policies for cross-border economic cooperation and the development of regional production networks. And at the local level, it guides decisions about urban planning and the provision of public services to support industrial development.

The new economic geography framework also highlights the importance of sequential development strategies. Initial investments in infrastructure and institutions may need to focus on creating a few strong economic centres capable of competing in international markets. Once these centres are established, policy attention can shift to developing connections between core and peripheral regions, allowing benefits to spread more widely. This approach recognises that attempting to develop all regions simultaneously may dilute resources and prevent any location from achieving the critical mass necessary for sustained growth.

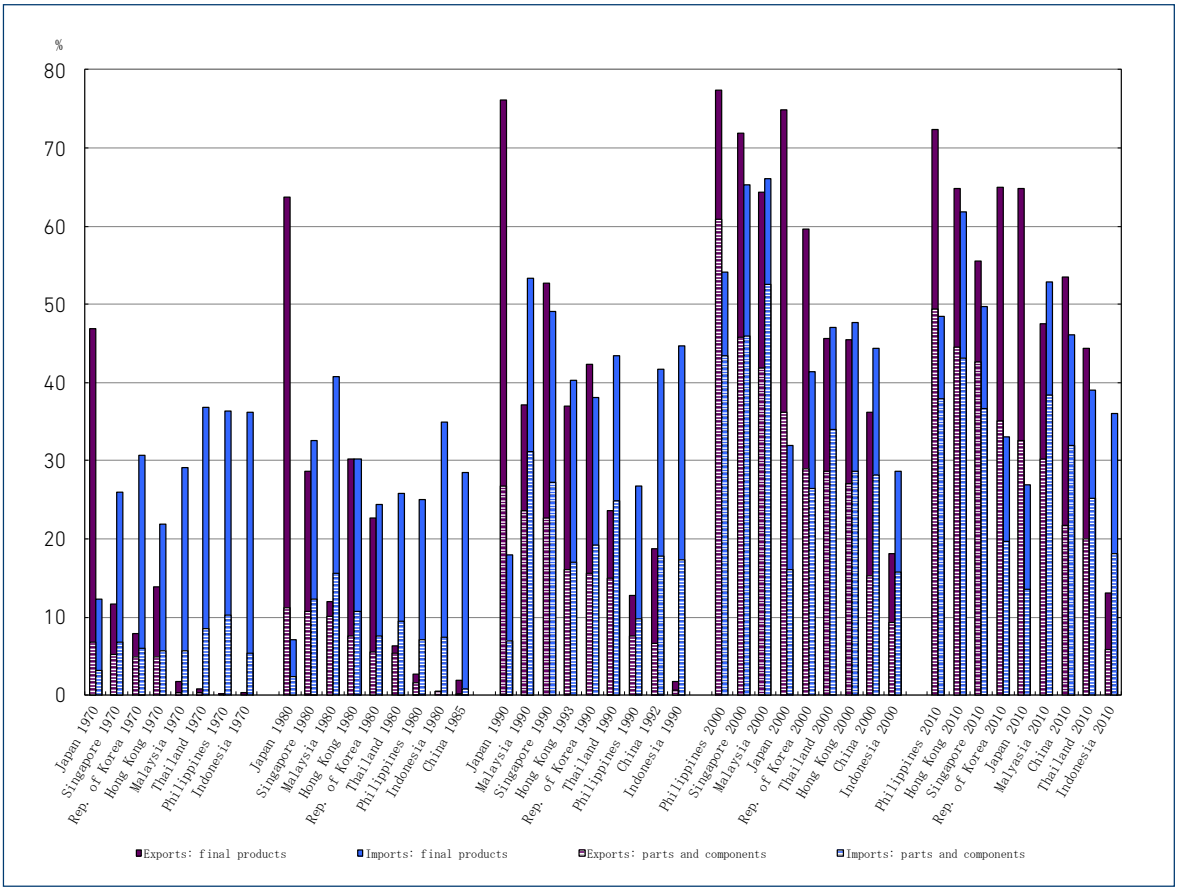
3. IPNs in East Asia: Empirical Evidence and Development Implications

The emergence and evolution of IPNs in East Asia, particularly since the 1990s, represents a significant transformation in global economic organisation. Whilst the first unbundling was relatively straightforward to observe through traditional statistical measures, the second unbundling's complex task-wise division of labour poses unique challenges for empirical assessment. This complexity, combined with East Asia's pioneering role in evolving from simple cross-border production sharing to sophisticated production networks, initially resulted in limited recognition of its importance in global economic literature.

3.1. Widening and Deepening of Production Networks

The machinery industry has emerged as the quantitative cornerstone of second unbundling operations. As shown in Figure 10.5, the transformation of trade patterns in East Asian economies from 1970 to 2010 reveals a striking shift in the composition of machinery trade. Whilst machinery trade in 1980 was dominated by final products, consistent with first unbundling patterns, by 1990, numerous countries had begun engaging in both exports and imports of machinery parts and components, signalling the emergence of the second unbundling.

Figure 10.5. Shares of Machinery Final Products and Parts in the Total Exports/Imports of East Asian Economics, 1970–2010



Notes: Data for 1970 and 1980 are based on the Standard International Trade Classification (SITC), whilst those for 1990, 2000, and 2010 use the Harmonised System (HS) classification. The detailed commodity codes are available upon request.

Sources: Authors based on UN Comtrade and World Atlas.

The geographic scope of second unbundling operations, particularly in machinery industries, remains limited to specific regions and countries. Notable participants include East Asian nations, Eastern European countries, and selected Latin American countries such as Mexico and Costa Rica. Research by Kimura, Takahashi, and Hayakawa (2007) highlighted distinctions between East Asian and European production networks through gravity equation analysis, examining differences in location advantages and service link costs. Further studies by Ando and Kimura (2012, 2014) revealed important interregional linkages, with East Asia becoming a crucial source for electrical parts and components for both Eastern Europe and Mexico.

3.2. Local Firm Capability Development and Network Integration

The success of countries in leveraging IPNs for development depends on multiple policy factors, as outlined in Table 10.1. These include measures to reduce network set-up costs, service link costs, and production costs. The policy framework must address both geographical distance considerations and organisational disintegration challenges, particularly for developing countries aiming to establish industrial agglomerations and integrate local firms into production networks.

Table 10.1. Required Policies for International Production Networks

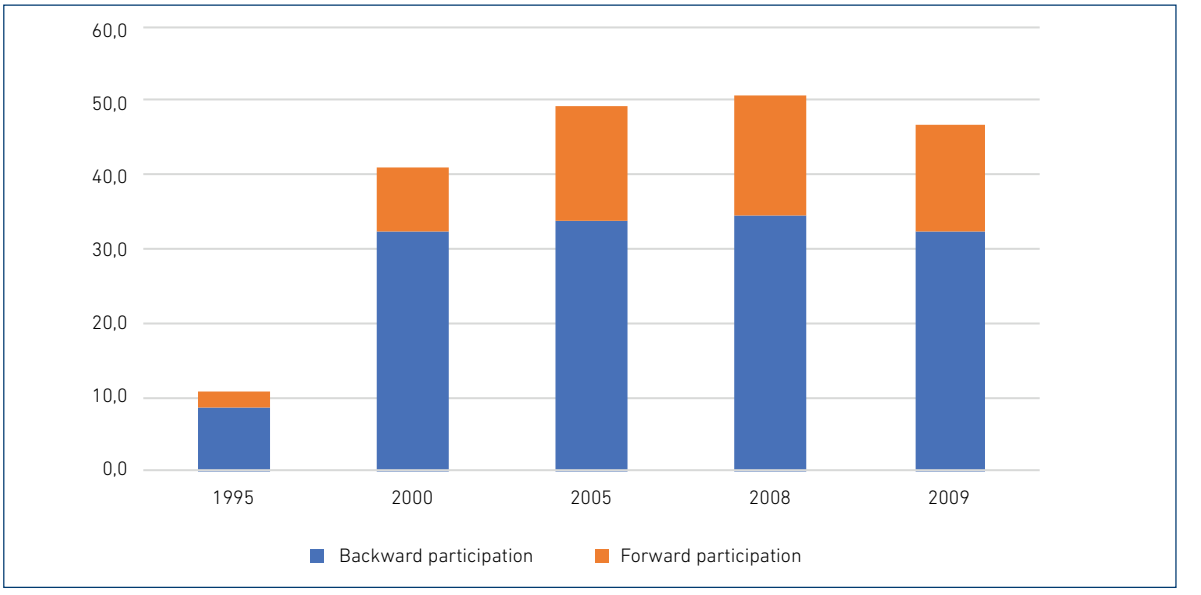
Item	Reduction in network set-up costs	Reduction in service link costs	Reduction in production costs *per se*
Fragmentation in the dimension of geographical distance	• Investment facilitation/ promotion	• Unstitutional connectivity (trade liberalisation/ facilitation and others)	• Liberalisation and competitiveness enhancement in production support services
		• Physical connectivity (hard infrastructure, logistics, and others)	• Investment liberalisation
			• Provision of infrastructure service such as electricity, industrial estates, and others
Fragmentation in the dimension of disintegration	• Business matching between multinationals and local firms	• Reduction in transaction costs in economic activities	• Generation of positive agglomeration effects by promoting SMEs and providing infrastructure in metropolitan areas
			• Enhancement of innovation capability

SMEs = small and medium-sized enterprises.

Source: Authors.

The experience of specific countries provides valuable insights into network integration strategies. For instance, the Philippines' electronics sector, as analysed by Aldaba (2017), demonstrates increasing participation in GVCs. As illustrated in Figure 10.6, the country's backward GVC participation grew substantially, with the foreign input share in electronic exports rising from 8.5% in 1995 to 34.4% in 2008. Similarly, forward GVC participation showed significant growth, with domestically produced inputs used in exports increasing from 2.2% to 16.2% over the same period.

Figure 10.6. GVC Participation Index (Share of Foreign and Domestic Input in Gross Exports) of the Philippines' Electronics Industry, 1995–2009 (%)



GVC = global value chain.

Source: Organisation for Economic Co-operation and Development (2013), OECD Global Value Indicators, May 2013, adopted from Aldaba (2017: 120).

http://stats.oecd.org/Index.aspx?DataSetCode=GVC_INDICATORS (accessed 9 November 2020).

The enhancement of local firm capabilities through interaction with multinational enterprises represents a crucial aspect of successful network participation. Technology spillovers occur through multiple channels, including demonstration effects, worker mobility, export activities, competitive pressures, and inter-firm linkages. Evidence from various East Asian countries demonstrates that whilst such spillovers are not automatic, they can be significant under appropriate conditions.

Research on Indonesian manufacturing by Blomström and Sjöholm (1999) and subsequent studies have revealed important insights about the nature of these spillovers. The effectiveness of technology transfer appears to be influenced by factors such as foreign ownership structure, foreign direct investment (FDI) characteristics, and export orientation. Studies by Banga (2003) and others have highlighted how the source country of FDI can affect spillover patterns, with Japanese FDI, for instance, generating different spillover effects compared with investment from the United States (US) due to variations in technology standardisation.

The role of vertical linkages in facilitating technology transfer has been particularly significant. Blalock and Gertler (2008) documented productivity gains amongst Indonesian firms supplying intermediate inputs to multinational enterprises, whilst studies by Xu and Sheng (2012) and Takii and Narjoko (2012) found positive spillovers through forward linkages in Chinese and Indonesian manufacturing, respectively. Recent research projects by the Economic Research Institute for ASEAN and East Asia (ERIA) have provided detailed insights into the mechanisms of knowledge transfer, highlighting the importance of direct engineer-level engagement and frequent face-to-face communication in facilitating innovation and capability development amongst local firms.

These findings underscore the complex interplay between foreign investment, local capability development, and successful participation in IPNs. The experience of East Asian countries demonstrates that whilst the opportunities presented by production networks are significant, realising their potential requires careful attention to policy frameworks, institutional development, and the nurturing of local firm capabilities.

3.3. Robustness and Resilience of Production Networks

A notable characteristic of East Asian production networks is their demonstrated robustness and resilience in the face of economic shocks. Whilst these networks can serve as transmission channels for negative shocks, such as the 2007/2008 global financial crisis or the 2011 Great East Japan Earthquake, research indicates that machinery parts and components trade in East Asia exhibits remarkable stability and recovery capacity. Studies by Obashi (2011) on the 1997 Asian financial crisis; Ando and Kimura (2012) on the global financial crisis and Great East Japan Earthquake; and Okubo, Kimura, and Teshima (2014) on the global financial crisis consistently demonstrated this resilience. The stability is attributed to the relation-specific nature of transactions within production networks, which involve substantial investment and encourage firms to maintain relationships during temporary disruptions.

4. Digital Technology Wave and the Third Unbundling: Implications for GVCs

The mid-2010s marked a significant technological breakthrough with the emergence of digital technology and what has become known as the 'third unbundling'. Whilst previous waves of globalisation benefited from ICT, the third unbundling represents a qualitative leap forward, primarily through its ability to reduce face-to-face transaction costs and create viable alternatives to in-person meetings.

4.1. Virtual Presence Revolution and New Business Models

The cornerstone of the third unbundling is the 'virtual presence revolution', enabled by advanced video and audio systems that facilitate remote operations across national boundaries. This technological advancement has created unprecedented possibilities, such as enabling engineers in one country to repair equipment in another through sophisticated robotics systems. The implications of this development are far-reaching, as it allows workers to provide services internationally, including those that traditionally required physical presence.

The reduction in face-to-face costs has catalysed the emergence of novel business models, particularly in the form of e-commerce. Defined as the process of purchasing, selling, transferring, or exchanging goods, services, or information via the internet, e-commerce has transformed traditional market concepts into virtual marketplaces. These digital platforms operate through various interaction types, with business-to-business (B2B) platforms like Alibaba facilitating transactions between businesses, whilst business-to-consumer (B2C) platforms such as AliExpress enable retail trade. Consumer-to-consumer (C2C) marketplaces, exemplified by Amazon, eBay, and Tokopedia, have created spaces where individuals can seamlessly transition between roles as buyers and sellers.

The evolution of e-commerce has given rise to diverse platform architectures, with businesses choosing between website-based and application-based interfaces, or often utilising both to maximise accessibility. Service providers like Gojek and Grab typically opt for app-based platforms to ensure easy customer access, particularly when the mobile nature of their business demands immediate connectivity and responsiveness.

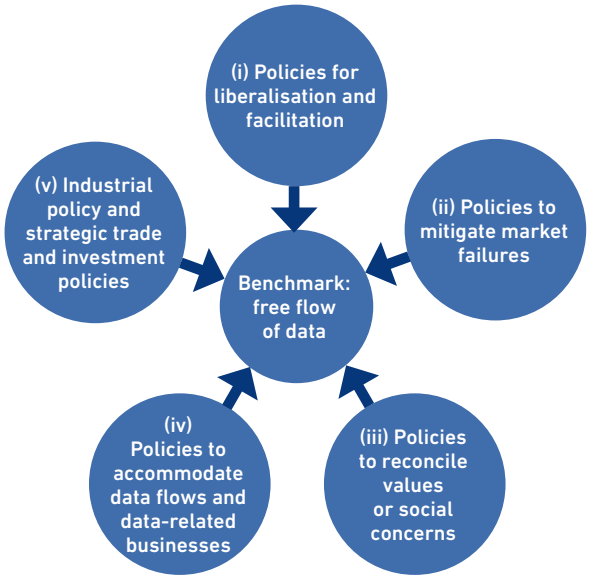
The e-commerce landscape has evolved into distinct market structures that serve different purposes within the digital economy. Portals such as Google and Yahoo focus on building consumer information communities, serving as gateways that funnel customer attention to targeted websites. Market makers, exemplified by eBay, take this concept further by actively facilitating business transactions between buyers and suppliers. Product or service providers like Amazon engage directly with customers, offering customised solutions whilst often incorporating their own financial technology solutions, such as proprietary payment systems and credit services.

The third unbundling has transformed the services sector, particularly in business services, creating new opportunities for global participation. The sector encompasses information technology (IT) outsourcing, which includes infrastructure, software, IT consulting, and software research and development (R&D); business process outsourcing, covering enterprise resource management, human resources management, and customer relationship management; and knowledge process outsourcing, which extends to business consulting and analytics, market intelligence, and legal services.

This framework has enabled developing countries to participate in GVCs through services for the first time. The success of this model is particularly evident in countries like India and the Philippines, which have emerged as leading destinations for offshore services. As of 2023, these industries contributed significantly to their respective economies, accounting for 8.1% of India's gross domestic product (GDP) and 5.4% of the Philippines' GDP, demonstrating the transformative potential of digital service integration in developing economies.

The implementation of digital technology and the third unbundling requires a comprehensive policy framework to support its development and manage its impacts. As illustrated in Figure 10.7, successful integration of digital technologies demands a multifaceted approach to policy development. This includes policies for liberalisation and facilitation, measures to mitigate market failures, frameworks to reconcile values and social concerns, mechanisms to accommodate data flows and data-related businesses, and strategic considerations for industrial and trade policy. These policy elements work together to create an environment that promotes innovation whilst addressing potential challenges and concerns.

Figure 10.7. Policies for the Flow of Data and Data-Related Business



(i) Policies for further liberalisation and facilitation
Non-discrimination for digital content, customs duties on electronic transmissions, customs duties on parcels, electronic authentication and signatures

(ii) Policies to mitigate market failures
Competition policy, consumer protection, IPR protection

(iii) Policies to reconcile values or social concerns with economic efficiency
Data and privacy protection, cybersecurity, other general exceptions

(iv) Policies to accommodate data flows and data-related businesses in the domestic policy regime
Taxation, e-payments/fintech/other industrial regulations, AI, **information disclosure of firms and statistics, due process for government access to privacy/industry data**

(v) Industrial policy and strategic trade and investment policies

AI = artificial intelligence, IPR = intellectual property rights.

Source: Authors.

The rapid evolution of digital technology and the emergence of the third unbundling present a compelling case for ASEAN and East Asia to pivot from their traditional focus on incremental innovation to more disruptive approaches, at least in the short term. Whilst the region has excelled at incremental improvements within IPNs and GVCs, particularly in manufacturing, the current technological revolution demands bolder innovation strategies. As discussed in Kimura and Narjoko (2021), really good ICT enables the third unbundling, and the emergence of new business models suggests that the traditional step-by-step advancement may not be sufficient to capitalise on emerging opportunities. This is particularly evident in the services sector, where the reduction in face-to-face costs and the proliferation of digital platforms are creating entirely new markets and business possibilities.

The COVID-19 pandemic accelerated this need for disruptive innovation by forcing rapid digital transformation across the region. The pandemic accelerated the application of communications technology, and the reduction in face-to-face costs may soon make the third unbundling one of the major forms of the international division of labour in ASEAN and East Asia (Kimura and Narjoko, 2021).

4.2. Urban Implications and The Role of Amenities

The COVID-19 pandemic has accelerated the adoption of digital technologies, particularly in terms of teleworking and service digitisation. However, this shift towards remote work and virtual interaction has not eliminated the importance of physical location. Instead, the third unbundling is creating a nuanced pattern of both concentration and dispersion, similar to the dynamics observed during the second unbundling.

In this evolving landscape, cities face new competitive pressures in attracting skilled workers through urban amenities. Drawing from seminal research by Glaeser, Kolko, and Saiz (2001), the attractiveness of urban centres increasingly depends on their ability to provide a rich variety of services and consumer goods, appealing aesthetics and physical settings, high-quality public services, and efficient transportation systems. These elements become particularly crucial as technological progress enhances workforce mobility, especially for educated and innovative individuals who face fewer border restrictions than unskilled labour.

The quality of urban amenities plays a decisive role in determining a city's ability to attract and retain human capital in the era of digital transformation. Cities must now focus on creating environments that support both professional success and personal fulfilment, recognising that the mobile, skilled workforce of the digital age bases location decisions not solely on employment opportunities, but on the overall quality of life a city can offer.

5. Challenges for the AEC Post 2025

Building upon the evolution of IPNs through successive waves of unbundling, ASEAN economies now face unprecedented challenges as they look beyond 2025. Whilst the second unbundling enabled the fragmentation of production processes and the third unbundling facilitated virtual presence and service trade, the emerging economic landscape presents complex new dimensions of transformation. These challenges manifest primarily through two interconnected vectors: the accelerating impact of digital technologies on production networks and trade patterns, and the emergence of geo-economic fragmentation that threatens established models of regional economic integration. Understanding these dual challenges requires careful analysis of both technological transformation dynamics and evolving patterns of international economic relations.

5.1. Implications of Digitalisation for International Trade, Investment, and Connectivity

Modified international division of labour

The digital transformation of IPNs presents a fundamental restructuring challenge for ASEAN economies. Drawing from the analytical framework of Obashi and Kimura (2021), this transformation manifests through a dual impact mechanism: IT generates concentration forces through automation and robotics, whilst communications technology creates dispersion forces by enabling remote coordination and virtual presence capabilities. This duality is particularly significant for East Asian production networks, which have historically demonstrated remarkable adaptability to technological change.

The empirical evidence suggests a nuanced restructuring pattern in production networks. The East Asian experience provides compelling evidence of how production networks can be successfully maintained and expanded in the digital era, with newly developed economies retaining and expanding production blocks through strategic approaches (Obashi and Kimura, 2021). The relationship between automation and human resources has proven particularly crucial in sectors where human–machine complementarity is high, such as electronics and precision machinery.

Regional production dynamics have evolved significantly under these influences. The integration of digital services with manufacturing processes has proven crucial to regional success, supported by balanced technology adoption approaches and strong service link connectivity (Obashi and Kimura, 2021). These developments align with the framework of unbundling of Baldwin (2016), where technological advances progressively overcome geographical constraints in international production.

Critical role of services and services liberalisation

The analysis reveals an increasingly critical role for services in digital-era production networks. For example, according to Meltzer (2014), about two-thirds of imported digital services now support export production in the case of European Union countries, indicating their crucial role in modern manufacturing processes. This transformation represents a fundamental shift in international production organisation, with modern production networks increasingly relying on sophisticated digital service capabilities.

The requirements for services liberalisation have become more complex and multifaceted. As highlighted in recent analysis by Aiyar et al. (2023), the growing regulatory divergence in digital governance and data flows threatens to complicate regional digital integration ambitions. A study by Cerdeiro et al. (2021) indicated that technological decoupling could amplify economic losses significantly, with some estimates suggesting output reductions of 8%–12% in severely affected economies.

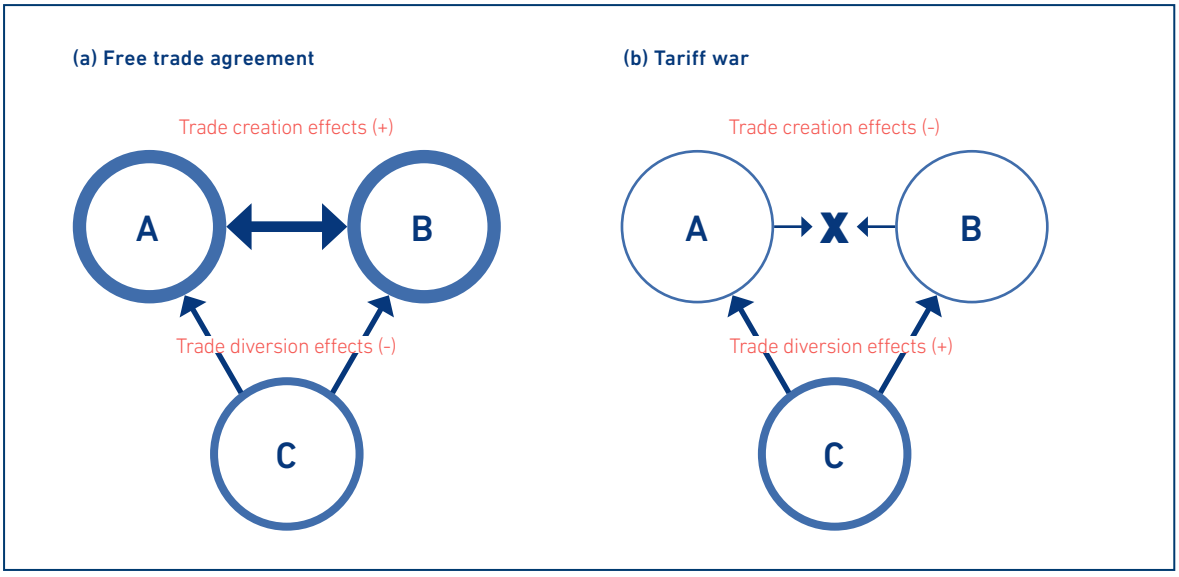
5.2. More Challenging Global Environment

Global trade fragmentation

The emergence of geoeconomic fragmentation presents significant challenges to ASEAN's economic integration objectives. A recent empirical analysis by Bolhuis, Chen, and Kett (2023) suggested that the impact of trade fragmentation could result in GDP losses ranging from 0.2% in limited scenarios to potentially 7% under more severe fragmentation conditions. San Andres, Vasquez, and Chen (2024) noted that Southeast Asian economies face amplified risks due to their high trade intensity and relatively thin economic buffers to absorb external shocks.

It is important to point out, however, that there could be some positive effects as a result of global trade fragmentation. This is shown in Figure 10.8, which presents the framework that demonstrates how free trade agreements and tariff wars affect third countries in international trade. In a free trade agreement scenario, countries A and B experience positive trade creation effects through their bilateral connection, whilst country C faces negative trade diversion effects (Figure 8a). Conversely, in a tariff war scenario (Figure 8b), whilst trade creation effects between countries A and B become negative, country C benefits from positive trade diversion effects. This framework shows that tariff wars, whilst functioning as a 'negative' free trade agreement, can generate positive trade diversion effects for third countries that extend beyond trade to include FDI flows.

Figure 10.8. Free Trade Agreement and Tariff Wars – Economic Effects on Third Countries



Source: Kimura (2024).

Emerging empirical evidence from recent studies has illuminated the significant redistributive effects of US–China trade tensions on global trade patterns, particularly highlighting substantial trade diversion benefits accruing to third countries. In a pioneering analysis, Nicita (2019) utilised United Nations Trade and Development (UNCTAD) data to demonstrate that about $21 billion of the affected $130 billion US–China bilateral trade was redirected to third countries during 2018–2019. This trade diversion notably benefited Taiwan, Mexico, and the European Union, establishing an initial understanding of the spatial redistribution of global trade flows. Building on these findings, Fajgelbaum et al. (2024) provided further empirical evidence of the lasting structural changes in global supply chains, emphasising Viet Nam's emergence as a primary beneficiary of manufacturing activity previously concentrated in China. Supporting these empirical observations, Kumagai et al. (2023) employed sophisticated Geographical Simulation Model analysis to demonstrate that even sharp East–West decoupling scenarios could generate positive trade diversion effects for neutral countries, particularly ASEAN Member States.

The sectoral analysis across these studies reveals nuanced patterns of trade redistribution contingent upon countries' existing industrial capabilities and institutional frameworks. Taiwan demonstrated particular strength in electronics and machinery sectors, whilst Mexico capitalised on its geographical proximity and North American Free Trade Agreement (NAFTA)/US–Mexico–Canada Agreement (USMCA) advantages in automotive and agricultural trade. Notably, both Nicita (2019) and Fajgelbaum et al. (2024) identified Viet Nam's significant gains in labour-intensive manufacturing, particularly in textiles and furniture, suggesting a broader pattern of industrial transformation in Southeast Asia. Fajgelbaum et al. (2024) further documented substantial spillover effects benefiting Malaysia and Thailand, especially in the electronics and consumer goods sectors.

Findings from these studies suggest both opportunities and challenges for ASEAN Member States in the context of US–China trade tensions. That is, whilst there are significant potential benefits through trade diversion effects, as demonstrated by Viet Nam's success in capturing relocated manufacturing activities, countries' ability to capitalise on these opportunities depends heavily on their existing industrial capabilities, infrastructure, and institutional frameworks. This presents a key challenge for ASEAN as a whole to enhance its members' readiness to absorb relocated production whilst ensuring that the benefits of trade diversion are distributed in a way that supports broader regional economic integration rather than exacerbating development gaps between Member States.

The weakening rules-based trading regime and ASEAN's strategic response

The global trading system is experiencing significant challenges, particularly in maintaining its rules-based structure. This situation presents both challenges and opportunities, especially for ASEAN and other middle powers. Pressures on rule-based integration have intensified substantially. Clayton, Maggiori, and Schreger (2023) documented how growing tensions between major trading partners increasingly challenge ASEAN centrality in the regional economic architecture. The International Monetary Fund (2023) highlighted how the proliferation of national security justifications for trade measures, combined with the rising complexity of managing multiple trade agreement frameworks, creates new obstacles for regional policy coordination.

The institutional adaptation required extends beyond traditional trade and investment frameworks. The World Trade Organization (WTO, 2023) indicated that ASEAN needs to strengthen its capacity for coordinated policy responses to strategic economic measures whilst enhancing regional mechanisms for dispute resolution. This aligns with the emphasis of Jakubik and Ruta (2023) on the importance of enhancing intra-ASEAN trade and investment linkages and developing coordinated approaches to supply chain resilience.

At the heart of these challenges lies a concerning trend where recent trade and industrial policies introduced by Group of Seven (G7) nations often appear to conflict with their WTO commitments and conventional trade norms. This pattern has not remained confined to developed economies but has spread to Global South countries, which are increasingly implementing policies that may violate established trade norms. The situation has been exacerbated by the ongoing crisis with the WTO Appellate Body, where the US blockage of member appointments has effectively halted its operations. By the end of 2023, 24 cases had become appeals 'into the void', including significant disputes like India's tariffs on ICT products and Indonesia's nickel export ban.

Despite these systemic challenges, ASEAN maintains a strong commitment to IPNs. Research, particularly through gravity equation analysis, demonstrates the crucial importance of machinery IPNs in ASEAN (e.g. Ando, Kimura, and Yamanouchi, 2022). These networks maintain robust connections between East Asia and Europe/the Americas, especially in general and electric machinery exports (see Ando, Hayakawa, and Kimura, 2024; and Ando, Kimura, and Yamanouchi, 2024). Whilst ASEAN and East Asia have historically benefited from the rules-based trading regime without taking a leading role in its maintenance, there is now a growing recognition that they must become more proactive in defending it.

The diminishing support for the WTO in the US has created a vacuum that middle powers, including ASEAN, must fill by taking more initiative in reaffirming the organisation's value. This involves addressing critical areas such as the dispute settlement mechanism and strengthening the WTO's role as a rule maker. The Multi-Party Interim Appeal Arbitration Arrangement (MPIA) has emerged as a crucial initiative, with several East Asian members including Japan, China, Hong Kong, Macao, the Philippines, Singapore, Australia, and New Zealand already participating. Additionally, cooperation in Joint Statement Initiatives, particularly in e-commerce, has gained momentum with 91 WTO members participating.

ASEAN can strengthen its position through various regional initiatives, with the Regional Comprehensive Economic Partnership (RCEP) playing a central role in supporting the rules-based trading regime and reducing policy uncertainties for the private sector. The organisation's engagement with other international bodies, such as Indonesia's interest in the Organisation for Economic Co-operation and Development (OECD) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), demonstrates a commitment to broader international cooperation and development.

6. Policy Implications

The evolution of IPNs through successive waves of unbundling, combined with emerging challenges in the digital era and geo-economic landscape, necessitates a carefully calibrated policy response from AEC stakeholders. The analysis presented in this paper yields several critical policy implications that warrant careful consideration.

A fundamental priority for AEC policymakers must be the continued nurturing and enhancement of regional production networks. This requires sustained attention to service link enhancement through strategic infrastructure investment and regulatory harmonisation. The empirical evidence suggests that successful IPN participation increasingly depends on sophisticated digital infrastructure and seamless cross-border data flows. Furthermore, the integration of local firms, particularly SMEs, into these networks demands targeted support mechanisms and structured programmes for technology transfer between multinational enterprises and domestic firms.

The complex interplay between digital transformation imperatives and emerging geo-economic challenges requires a nuanced policy approach. Regional digital architecture development must progress in parallel with measures to enhance geo-economic resilience. This includes establishing coordinated regulatory frameworks for digital trade whilst simultaneously developing mechanisms to mitigate concentration risks in regional value chains. The evidence from East Asian economies demonstrates that successful adaptation to digital transformation requires both technological capability development and strategic approaches to maintaining production block advantages.

Institutional adaptation emerges as a critical success factor in navigating the evolving economic landscape. The research findings highlight the need for enhanced regional policy coordination mechanisms, particularly in areas of digital economy governance and strategic economic measures.

This institutional strengthening must extend beyond traditional trade and investment frameworks to encompass new areas of digital regulation and data governance. The experience of advanced regional economies suggests that early investment in regulatory expertise and technical capabilities yields significant long-term benefits in managing complex trade relationships and technological change.

With respect to strengthening the rule-based trading regime, several complex issues require careful consideration and resolution. China's integration into the rules-based trading system remains a critical challenge, encompassing issues such as state-owned enterprises, digital governance, and the interpretation of national security exceptions in trade rules. The balance between subsidies and production issues also requires new approaches and potentially new trade rules.

ASEAN's strategic role in this evolving landscape is becoming increasingly important. By maintaining a neutral stance, the organisation can benefit both regional and global interests. This position allows ASEAN to capitalise on positive trade diversion whilst simultaneously deepening its involvement in high-tech value chains. Collaboration with other pro-trade middle powers has become essential in reducing policy risks and maintaining the rules-based trading regime.

The path forward requires ASEAN to take a more proactive stance in international trade governance whilst maintaining its strategic neutrality. This balanced approach can serve both regional interests and the broader global trading system, helping to stabilise and strengthen international trade relations during a period of significant change and challenge. Through these efforts, ASEAN can help ensure the continuation of a rules-based trading system that benefits all participants whilst adapting to the evolving needs of the global economy.

Urban development policy requires particular attention in the context of digital transformation. The analysis reveals that cities' ability to attract and retain skilled labour increasingly depends on the quality of urban amenities and smart infrastructure. Policy frameworks must balance the concentration forces generated by digital agglomeration with the dispersion opportunities created by remote work capabilities. This balance is crucial for maintaining dynamic and inclusive urban economies that can support innovation whilst managing congestion and environmental impacts.

Innovation ecosystem development represents another crucial policy priority. The research indicates that successful adaptation to digital transformation requires robust regional innovation networks and effective knowledge transfer mechanisms. Policy frameworks should support the development of regional innovation hubs whilst facilitating cross-border research collaboration and academic–industrial partnerships. This approach aligns with the observed patterns of successful technology adoption and capability development in leading East Asian economies.

In the meantime, the accelerated digitalisation – especially as a by-product of the COVID-19 pandemic, which is entangled with the third unbundling – suggests that rather than focusing on gradual improvements to existing processes and products, companies and policymakers should prioritise breakthrough innovations that can fundamentally reshape how business is conducted. This is particularly true in areas such as digital services, e-commerce, and cross-border service provision. This shift would position the region to better compete in the emerging digital economy whilst maintaining its strengths in traditional manufacturing networks.

Finally, building economic resilience must become a core policy focus. The analysis of production network responses to various shocks demonstrates the importance of developing robust early warning systems and regional coordination mechanisms for crisis response. Policy frameworks should encourage the development of redundant supply chain capabilities whilst maintaining the efficiency benefits of specialisation and scale. This balanced approach to resilience building appears particularly crucial given the increasing frequency of both technological and geo-economic disruptions.

These policy implications suggest that successful navigation of the emerging economic landscape will require sustained commitment from AEC member states and careful attention to the sequencing of reforms. The evidence indicates that prioritising fundamental enabling conditions whilst building capacity for more complex interventions over time offers the most promising path forward. This measured yet comprehensive approach will help ensure that ASEAN can maintain its competitive position in GVCs whilst adapting to emerging technological and geoeconomic challenges.

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