



# GVC RECONFIGURATION

## Risks and Opportunities for ASEAN Members

Sithanonxay Suvannaphakdy and  
Pham Thi Phuong Thao

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# FOREWORD

The economic, political, strategic and cultural dynamism in Southeast Asia has gained added relevance in recent years with the spectacular rise of giant economies in East and South Asia. This has drawn greater attention to the region and to the enhanced role it now plays in international relations and global economics.

The sustained effort made by Southeast Asian nations since 1967 towards a peaceful and gradual integration of their economies has had indubitable success, and perhaps as a consequence of this, most of these countries are undergoing deep political and social changes domestically and are constructing innovative solutions to meet new international challenges. Big Power tensions continue to be played out in the neighbourhood despite the tradition of neutrality exercised by the Association of Southeast Asian Nations (ASEAN).

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# **GVC Reconfiguration: Risks and Opportunities for ASEAN Members**

By Sithanoxay Suvannaphakdy and Pham Thi Phuong Thao

## **EXECUTIVE SUMMARY**

- The COVID-19 pandemic, geopolitical tensions and US-China trade disputes, and the Russia-Ukraine war have increased the risk of global value chain (GVC) disruptions and forced firms to strengthen resilience in their supply chains and operations.
- MNCs have diversified suppliers, established new production sites, and shifted production closer to consumers. ASEAN countries are becoming increasingly attractive destinations for foreign investors.
- This paper gauges the position of ASEAN in GVCs and assesses the risks and opportunities of GVC reconfiguration for ASEAN countries. ASEAN countries are increasing their participation in GVCs and raising domestic value-added. The relocation of production sites from China to ASEAN countries could enhance their participation in GVCs. Should MNCs increase the concentration of supplier and buyer markets, ASEAN countries could become more vulnerable to external shocks.
- In addition, this paper assesses the risk of thirty-five sectors of GVCs in ASEAN countries using value-added trade data from ADB's multi-region input-output tables (MRIO).
- Brunei, Cambodia, Indonesia, Laos, the Philippines and Thailand face significant risks of both supplier and buyer market concentrations. The remaining ASEAN countries face the risk of either supplier market concentration or buyer market concentration.
- Any restrictions on the use of intermediate inputs from the US or China to manufacture goods in ASEAN can cause substantial disruption to ASEAN GVCs. The upstream and downstream GVCs in ASEAN countries are dominated by the US, China and Japan.



- Extraregional trade integration could be enhanced by linking key suppliers and buyers in China, the US, and Japan to producers in ASEAN countries.
- Trade policy measures to strengthen ASEAN GVCs should focus on a faster release of perishable goods and intermediate inputs at border checkpoints, accelerating the cross-border paperless trade reforms, promoting the utilization of rules of origins under RCEP, streamlining non-tariff measures, and digitalizing ASEAN GVCs.

# **GVC Reconfiguration: Risks and Opportunities for ASEAN Members**

By Sithanonxay Suvannaphakdy and Pham Thi Phuong Thao<sup>1</sup>

## **1. INTRODUCTION**

The COVID-19 pandemic, growing geopolitical tensions and trade disputes between the US and China, and the Russia-Ukraine war have further increased the risk of global value chain (GVC) disruptions and forced firms to strengthen resilience in their supply chains and operations. The GVC is the sequence of all functional activities required in the process of value creation involving more than one country (UNCTAD 2013). These activities range from preproduction (e.g., research and development, product design, and branding) to production and postproduction (e.g., marketing, distribution, and retailing). According to the World Bank (2020), about half of global trade involves GVCs, with services, raw materials, parts, and components crossing borders multiple times.

However, GVCs are facing risks. Firstly, the pandemic has brought disruptions on both the supply and demand sides. On the supply side, infections reduce labour supply and productivity in export-oriented sectors, while lockdowns, business closures and social distancing cause supply disruptions. On the demand side, layoffs, loss of income and worsened economic prospects reduce household consumption and corporate investment. The extreme uncertainty about the path, duration

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<sup>1</sup> Sithanonxay Suvannaphakdy is Lead Researcher at the ASEAN Studies Centre, ISEAS – Yusof Ishak Institute, Singapore, and Pham Thi Phuong Thao is Senior Research Officer at the same centre. We are grateful to valuable comments and suggestions from Mr Choi Shing Kwok, Dr Terence Chong, and Ms Sharon Lillian Seah. All remaining errors are our own.

and impact of the pandemic could lead to reductions in business and consumer confidence which in turn could increase job losses and investment. Secondly, US-China trade tensions have added 20 per cent to global uncertainty since 2016, peaking during the first quarter of 2020 and declining under the Biden administration (Solingen, Meng, and Xu 2021).

The McKinsey Global Institute estimates the negative economic impact of the pandemic to be at US\$30,000 billion or 35.2 per cent of global gross domestic product (GDP) in 2020, and that of the US-China trade dispute at US\$200 billion or 0.2 per cent of global GDP. Balancing the economic efficiency gains from the GVCs and the economic costs of the pandemic and geopolitical shocks entails a search for an ideal GVC that can resist, mitigate and adapt to disruptions in supply and production chains.

This study assesses risks to GVCs in thirty-five sectors in nine ASEAN countries using value-added trade data from the Asian Development Bank's (ADB) multi-region input-output tables (MRIO). These countries are Brunei, Cambodia, Indonesia, Laos, Malaysia, the Philippines, Singapore, Thailand and Vietnam. Myanmar is not included because its value-added trade data are not available in the ADB's MRIO. The GVCs include two primary sectors, nine low-technology manufacturing sectors, seven medium- to high-technology manufacturing sectors, 12 business services sectors, and five personal and public services sectors (Figure 1).

This study focuses on two sources of risks, namely supplier market concentration and buyer market concentration. The supplier market is the upstream part of the GVCs, where ASEAN countries import intermediate inputs and use them in producing goods for exports. The buyer market is the downstream part of the GVCs, where ASEAN countries export their goods to foreign buyers. The supplier market is concentrated if ASEAN countries use a high share of imported intermediate inputs in producing goods for exports, and those imported intermediate inputs are sourced from a limited number of countries. Similarly, the buyer market is concentrated if ASEAN countries sell a high share of domestically produced goods to a limited number of foreign buyers.

The risk assessment results can be helpful for ASEAN policymakers in two ways. First, the risk assessment by sector could serve as a reference

**Figure 1: Thirty-Five Sectors of ADB's MRIO Used in the Risk Assessment of ASEAN GVCs**



Source: Authors' construction based on ADB's online database "ADB MRIO", <https://mr.io.adb.org/online/downloads/> (accessed 20 September 2022).

for designing sector-specific strategies for GVC resilience in ASEAN. It reveals which sectors in each ASEAN country are vulnerable to, and in trading with which partners are most susceptible to external shocks. This is particularly important when designing risk-mitigation strategies in the face of geopolitical shocks such as US-China tensions and the Russia-Ukraine war.

Second, the risk assessment could be used to enhance the position of ASEAN countries in GVCs due to the possibility of firms' relocation to strengthen the supply chain resilience. Firms' relocation presents ASEAN with an opportunity to attract more foreign direct investment (FDI) and advance the region's economic integration into GVCs. In this regard, policymakers may need to balance the expected benefits of greater participation in GVCs, and the potential risks associated with them. The risk assessment results may help design domestic support policies to enhance the resilience of supply chains.

This study consists of four sections. After the introduction in section 1, section 2 gauges the current position of ASEAN in GVCs<sup>2</sup> based on value-added trade patterns, and provides evidence of MNCs' relocation of production sites as a key driver of ASEAN's participation in GVCs in the medium term. Section 3 presents the risk assessment results of ASEAN GVCs across sectors and key trading partners. Section 4 concludes by providing a set of policy recommendations to harness the benefits of GVC reconfiguration.

## **2. ROLE OF ASEAN IN GLOBAL VALUE CHAINS**

This section gauges the position of ASEAN in GVCs based on value-added trade patterns. It reveals that ASEAN countries are increasingly participating in GVCs. In the medium term, the position of ASEAN in

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<sup>2</sup> Enhancing participation in GVCs is identified in Element A6 (Enhancing Participation in Global Value Chains) under the Characteristic 1 (Highly Integrated and Cohesive Economy) of the AEC Blueprint 2025. However, it does not set the target on the extent to which each ASEAN country aims to participate in GVCs by 2025.

GVCs will be enhanced by MNCs' relocation of production sites from China to ASEAN countries.

## **2.1 Value-Added Trade Patterns in ASEAN**

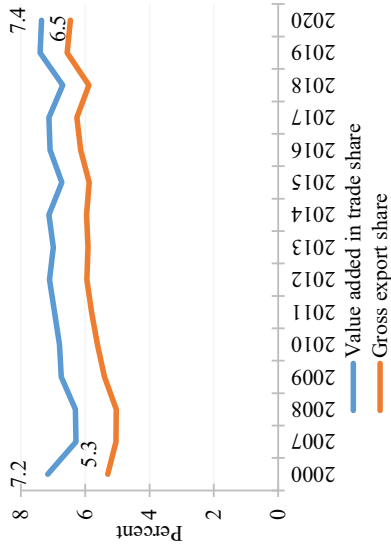
ASEAN countries are increasingly participating in GVCs and gaining domestic value-added, albeit many are starting from a very low base. The share of global value-added trade captured by ASEAN economies grew from about 7.2 per cent in 2000 to 7.4 per cent in 2020. As a group, ASEAN economies are capturing an increasing share of the global value-added trade pie, which is consistently higher than the gross export share (Figure 2a). As global trade grows, developed economies appear to rely increasingly on imported content for their exports, allowing ASEAN countries to add disproportionately to their domestic value-added in exports.

Value-added trade is unevenly distributed across ASEAN countries (Figure 2b). It is relatively large in Indonesia, Malaysia, Singapore, Thailand, and Vietnam, but relatively small in Brunei, Cambodia, Laos and the Philippines. It consists of two components, namely domestic and foreign value-added. Foreign value-added (FVA) as a share of exports indicates what part of a country's gross exports consists of inputs that have been produced in other countries. Domestic value-added (DVA) is the part of exports created in the country, i.e., the part of exports that contributes to GDP.

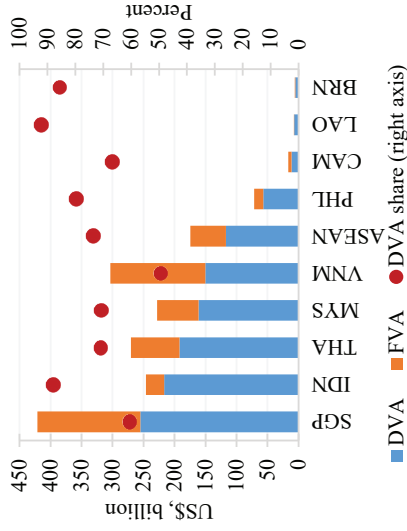
The share of domestic value-added in total value-added trade varies across ASEAN countries depending on the size of the economy, the composition of export products, and economic structure. ASEAN countries that have significant shares of natural resources, oil or other commodities in their exports, such as Brunei, Indonesia and Laos, tend to have higher shares of domestic value-added trade, as such exports are at the beginning of GVCs and require few foreign inputs. In contrast, countries that have significant shares of exports in highly segmented industries (e.g., automotive, chemicals, machinery, electronics, and textiles) such as Malaysia, Thailand and Vietnam may need to import more foreign intermediate inputs to generate exports. Similarly, countries that have significant shares of services such as Singapore may

**Figure 2: Patterns of GVC Trade in ASEAN Countries (Excluding Myanmar)**

a. Share of ASEAN in global value-added and gross exports, 2000–20



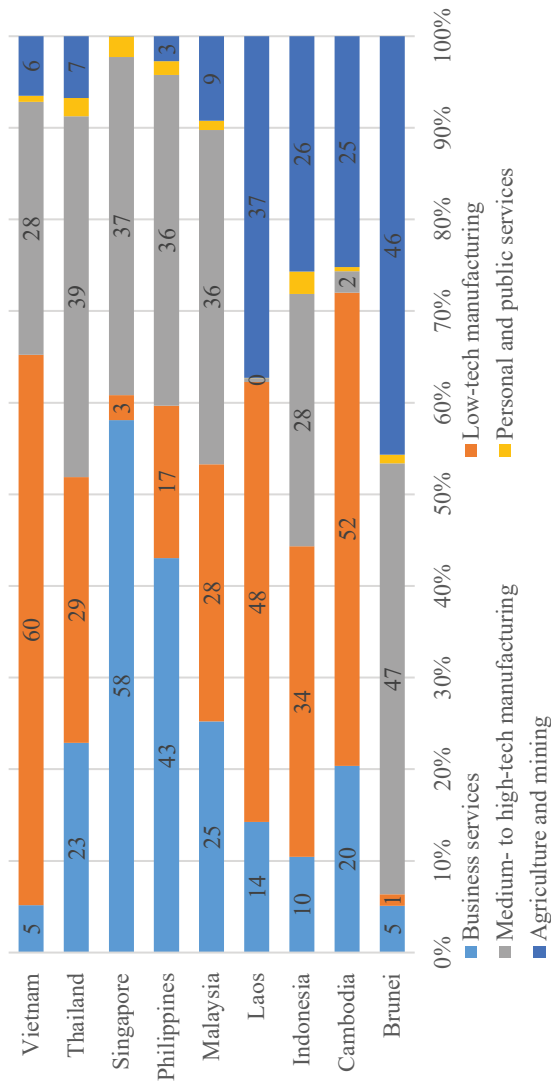
b. Domestic and foreign value-added trade in ASEAN, 2021



Note: DVA = Domestic value-added; FVA = Foreign value-added; DVA share = Share of DVA in total value-added trade (DVA + FVA). Value-added trade (DVA share) for ASEAN refers to the average of value-added trade (DVA share) across nine ASEAN countries.

Source: Authors' calculation using data from ADB's MIRIO.

**Figure 3: Structure of GVC-Related Trade in ASEAN, 2021**



Source: Authors' calculation using data from ADB's MRIO.



need to import more foreign intermediate and final products for further processing and re-export (Figure 3).

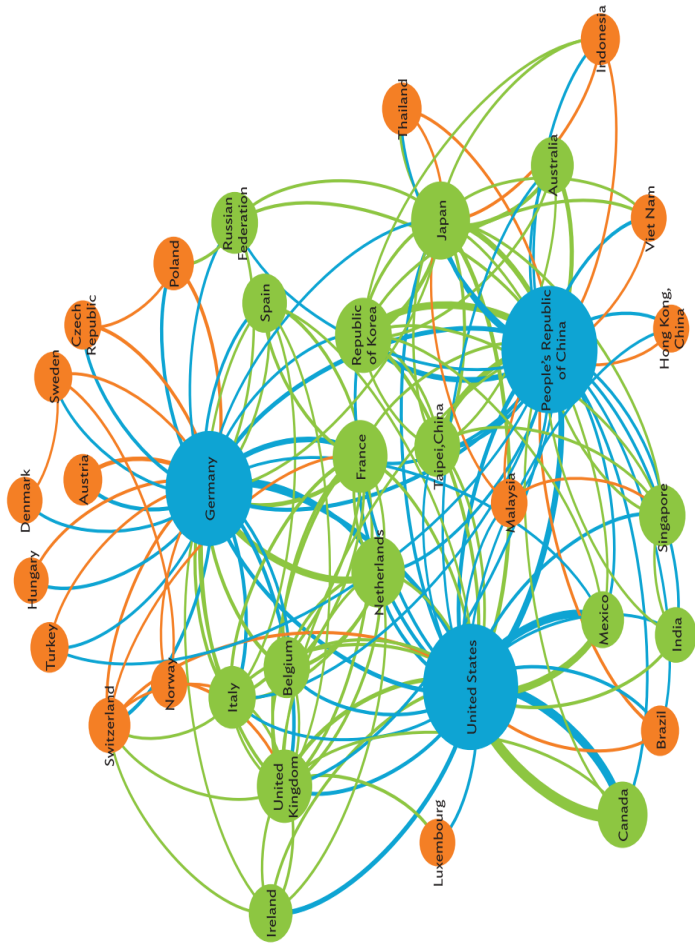
Five ASEAN countries—Indonesia, Malaysia, Singapore, Thailand and Vietnam—have relatively strong production chains with countries in the region, demonstrated by the thickness of lines linking them to other countries in Figure 4. The top-3 global production hubs are China, US, and Germany, which have tight trade links in electronics and high-technology equipment. China has a strong linkage of GVC-related trade with the US, South Korea, Japan, and Australia, and a relatively moderate trade linkage with ASEAN-5 countries. Meanwhile, ASEAN-5 countries have established production chains with Japan, South Korea, Australia, and India. The remaining five ASEAN countries, namely Brunei, Cambodia, Laos, Myanmar, and the Philippines, are not illustrated in Figure 4 due to the limited amount of their value-added trade.

## **2.2 Firms' Relocation to ASEAN Countries**

The pandemic is one of the key factors (e.g., fragmentation of production to reduce costs, US-China trade war) that contributes to the movement of firms to ASEAN countries. The World Bank's MNC survey in September 2020 shows that more than 80 per cent of multinational corporations (MNCs)—firms that conducted direct business activities and owned assets in at least two countries—faced a net income decline by an average of 37 per cent. During the pandemic, three in four MNCs experienced a decline in supply chain reliability, limiting access to raw and intermediate inputs essential to production. They have responded to uncertainties by diversifying suppliers (37 per cent of MNCs), establishing new production sites (18 per cent), and shifting production closer to consumers by nearshoring or reshoring (14 per cent). Rising energy prices caused by the Russia-Ukraine war increases transportation costs, reinforcing MNCs' incentive to relocate their production sites closer to consumers.

MNCs' decisions to relocate their production sites or to establish new ones are affected by both economic and non-economic factors. A key trade-off in GVC resilience involves the diversification of risks versus lower production costs and higher quality inputs, which are sourced

**Figure 4: Global Production Chains**



Source: Adapted from Abiad et al. (2018).

in markets with niche expertise. Products such as furniture, textiles, apparel, transportation equipment, electrical equipment, computer, and electronics have relatively low additional costs in diversifying suppliers and production sites since the technology used in these industries are not very complex and not subject to large economies of scale.

In contrast, the geographical shift of production sites of advanced manufacturing products such as semiconductors, pharmaceuticals and automobiles would be largely driven by non-economic factors such as national security and self-sufficiency. These products require substantial investment in the establishment of new production plants, and are technology-intensive, given that there are only a few suppliers in the world.

For example, the US government recently announced a plan to invest US\$52 billion in the chip industry to build more factories domestically in response to the global semiconductor shortage over the past two years. While many advanced chips are designed by the US, 78.1 per cent of them are manufactured in Asia-Pacific countries, primarily in mainland China and Taiwan (36.4 per cent), South Korea (18.0 per cent), and Japan (17.6 per cent). Establishing a new semiconductor fabrication plant can cost US\$10 billion or more, and requires specialized suppliers and contractors. The recent surge in demand for chips—fuelled in part by the demand for more laptops and cars—did not lead to more chip fabrication plants because it would take years to construct a new factory, and the sunk cost of building such a factory would not be sufficiently recovered over a short period of time, as demand could subside.

The expansion of MNCs' business activities across borders is primarily in the form of FDI through the establishment of subsidiaries in foreign countries. The number of MNCs has increased rapidly from roughly 7,000 parent MNCs in 1970 to 38,000 in 2000 and more than 100,000 in 2011. An analysis of 2,188 top global MNCs by revenue in 2020 reveals that 62 per cent of them originated in five countries, namely the US (33 per cent), Japan (12 per cent), China (10 per cent), the UK (5 per cent), and India (4 per cent). These MNCs have 216,898 subsidiaries, 54 per cent of which are located in the US (28 per cent), the UK (9 per cent), China (8 per cent), Germany (4 per cent), and France (4 per cent).

ASEAN is becoming an attractive destination for foreign investors, especially from the US and China. Even before the COVID-19 outbreak, MNCs had already begun to diversify their supply chains beyond China, owing to tariffs arising from US-China trade tensions. China's GoerTek was the first of Apple's leading equipment suppliers that shifted its production to Vietnam. US's Google and Japan's Sharp also decided to move Pixel smartphone and computer production to Vietnam to avoid US tariffs. Panasonic later joined this relocation trend by shifting its auto stereo production from China to Thailand (Table 1).

The pandemic has reinforced this trend. China—one of the top-3 GVC hubs—continues to implement its zero COVID-19 policy. ASEAN countries are gradually reopening their borders, dropping or loosening quarantine and testing requirements, and easing domestic restrictions. Firms are considering relocating to Southeast Asia, or reducing investments in China if COVID-19 controls persist in the coming years. For example, German automotive supplier Brose is considering Thailand and Vietnam as new production locations and Denmark's Lego has announced that it would build a new factory in southern Vietnam (Table 1).

FDI inflows into ASEAN rose from US\$113.4 billion per annum or 7.8 per cent of global FDI during 2010–14 to US\$155.1 billion per annum or 11.1 per cent of global FDI during 2017–21. Inward FDI strongly recovered from the pandemic with a growth rate of 43.6 per cent in 2021 after a contraction of 30.2 per cent in 2020. However, FDI inflows are unevenly distributed across ASEAN countries. 96.1 per cent of ASEAN's FDI inflows in 2021 were concentrated in six ASEAN countries, namely Singapore (56.6 per cent), Indonesia (11.5 per cent), Vietnam (8.9 per cent), Malaysia (6.6 per cent), Thailand (6.5 per cent), and the Philippines (6.0 per cent). The remaining 3.9 per cent were accounted for by Cambodia (2.0 per cent), Myanmar (1.2 per cent), Laos (0.6 per cent), and Brunei (0.1 per cent). The top-5 sources of ASEAN's FDI inflows were Japan (12.1 per cent), the US (12.0 per cent), China (7.7 per cent), Hong Kong (7.2 per cent), and South Korea (4.3 per cent).

**Table 1: Evidence of Production Relocation from China to ASEAN Countries, 2018–22**

Company	Sector	Year	Former Production Site	New Production Site
American/European firms (n = 13)				
Nidec	Japanese motor supplier	2018	China	SEA/Malaysia
Google	Smartphones	2019	China	Vietnam
Apple	Smartphones	2019	China	Mexico, SEA
Dell	PCs	2019	China	Taiwan, Philippines, Vietnam

Notable Comments from Media Report	Source
<ul style="list-style-type: none"> <li>• Nidec moved part of its production out of China in 2018 because of the trade war, high labour costs, and Chinese government policies that encourage green manufacturing plants to remain in China.</li> </ul>	<a href="https://insightsolutionsglobal.com/move-manufacturing-production-to-malaysia-from-china/">https://insightsolutionsglobal.com/move-manufacturing-production-to-malaysia-from-china/</a> ( <i>Insight</i> , 18 March 2019)
<ul style="list-style-type: none"> <li>• Google “seeks to build a low-cost supply chain in SEA”</li> <li>• Google shifted production of its Pixel smartphone from China to Vietnam.</li> <li>• The push to develop a Vietnamese production base reflects the twin pressures of higher Chinese labour costs and the spiralling tariffs resulting from the US-China trade war.</li> </ul>	<a href="https://hanoitimes.vn/google-to-shift-pixel-smartphone-production-from-china-to-vietnam-45950.html">https://hanoitimes.vn/google-to-shift-pixel-smartphone-production-from-china-to-vietnam-45950.html</a> ( <i>Hanoi Times</i> , 29 August 2019)
<ul style="list-style-type: none"> <li>• Apple Inc asked its major suppliers to assess the cost implications of moving 15 per cent–30 per cent of their production capacity from China to Southeast Asia as it prepares for a restructuring of its supply chain due to the extended US-China trade dispute.</li> </ul>	<a href="https://www.reuters.com/article/us-apple-china-restructuring-idUSKCN1TK0XN">https://www.reuters.com/article/us-apple-china-restructuring-idUSKCN1TK0XN</a> ( <i>Reuters</i> , 19 June 2019)
<ul style="list-style-type: none"> <li>• Dell will move 30 per cent of laptop production out of China due to higher operating costs caused by the US-China trade dispute.</li> </ul>	<a href="https://asia.nikkei.com/Economy/Trade-war/HP-Dell-and-Microsoft-look-to-join-electronics-exodus-from-China">https://asia.nikkei.com/Economy/Trade-war/HP-Dell-and-Microsoft-look-to-join-electronics-exodus-from-China</a> ( <i>Nikkei</i> , 3 July 2019)

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**Table 1 — cont'd**

<b>Company</b>	<b>Sector</b>	<b>Year</b>	<b>Former Production Site</b>	<b>New Production Site</b>
Microsoft, Alphabet, Amazon, Sony, and Nintendo	Game Console and smart speaker manufacturing	2019	China	SEA
Adidas	Shoes	Trade war period	China	Vietnam, Thailand, Indonesia
HP	Computer/laptop	Trade war period		Thailand
Panasonic, Yokowo, Pegatron		Trade war period	China	Southeast Asian countries, Mexico
Nike, H&M, Gap	Apparel and garment	Trade war period	China	Vietnam

Notable Comments from Media Report	Source
<ul style="list-style-type: none"> <li>• Considering moving out of China because of the US-China trade dispute.</li> </ul>	<p><a href="https://www.cnbc.com/2019/07/03/hp-dell-other-tech-firms-plan-to-shift-production-out-of-china-nikkei.html#:~:text=HP%20per%20cent%20and%20Dell%20Technologies%20are,the%20country%2C%20the%20Nikkei%20added.">https://www.cnbc.com/2019/07/03/hp-dell-other-tech-firms-plan-to-shift-production-out-of-china-nikkei.html#:~:text=HP per cent20and%20Dell%20Technologies%20are,the%20country%2C%20the%20Nikkei%20added.</a> (CNBC, 3 July 2019)</p>
<ul style="list-style-type: none"> <li>• About 25 per cent of manufacturers for Adidas in China were shut down due to the trade war. Opportunities open for counterparts in Vietnam, Thailand, Bangladesh, and Indonesia thanks to low-cost benefits.</li> </ul>	<p><a href="https://www.asiaperspective.com/move-manufacturing-china-to-southeast-asia/">https://www.asiaperspective.com/move-manufacturing-china-to-southeast-asia/</a> (<i>Asia Perspective</i>, 18 July 2022)</p>
<ul style="list-style-type: none"> <li>• HP has reportedly planned to shift 20–30 per cent of its Chinese production to Taiwan and Thailand to mitigate the risks of rising costs and disruptions</li> </ul>	<p><a href="https://www.asiaperspective.com/move-manufacturing-china-to-southeast-asia/">https://www.asiaperspective.com/move-manufacturing-china-to-southeast-asia/</a> (<i>Asia Perspective</i>, 18 July 2022)</p>
<ul style="list-style-type: none"> <li>• Relocated their factories to Southeast Asian countries and Mexico due to the trade war, high labour rate, and Chinese government policies that encourage green manufacturing plants to remain in China.</li> </ul>	<p><a href="https://insightsolutionsglobal.com/move-manufacturing-production-to-malaysia-from-china/">https://insightsolutionsglobal.com/move-manufacturing-production-to-malaysia-from-china/</a> (<i>Insight</i>, 18 March 2019)</p>
<ul style="list-style-type: none"> <li>• Halting expansion plans for fear of pushing up factor input costs due to the trade war.</li> </ul>	<p><a href="https://asia.nikkei.com/Economy/Trade-war/Vietnam-s-apparel-sector-fears-cost-surge-as-tech-giants-move-in">https://asia.nikkei.com/Economy/Trade-war/Vietnam-s-apparel-sector-fears-cost-surge-as-tech-giants-move-in</a> (<i>Nikkei</i>, 2 July 2019)</p>

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*Table 1 — cont'd*

<b>Company</b>	<b>Sector</b>	<b>Year</b>	<b>Former Production Site</b>	<b>New Production Site</b>
Nike	Shoes	2021	China	Vietnam
Apple	Air Pods	2020–22	China	Vietnam
Apple	Apple Watch and Mac production	2022	China	Vietnam

Notable Comments from Media Report	Source
<ul style="list-style-type: none"> <li>• Nike reduced its dependence on Chinese suppliers by increasing shoe manufacturing in Vietnam.</li> <li>• The share of Nike shoes produced in China reduced from 35 per cent of total Nike shoes in 2006 to 21 per cent in 2021. Meanwhile, Nike shoes produced in Vietnam accounted for 51 per cent of total Nike shoes in 2021.</li> </ul>	<p><a href="https://www.asiaperspective.com/move-manufacturing-china-to-southeast-asia/">https://www.asiaperspective.com/move-manufacturing-china-to-southeast-asia/</a> (<i>Asia Perspective</i>, 18 July 2022)</p>
<ul style="list-style-type: none"> <li>• Apple plans to have 30 per cent of its classic Air Pods produced in Vietnam instead of China.</li> <li>• Foxcom, the major supplier of Apple, invested US\$270 million in a plant to manufacture laptops and tablets in Vietnam in 2020.</li> <li>• Apple tried to move more production to Vietnam in 2021 but the plan was postponed due to the pandemic. It was resumed in 2022.</li> </ul>	<p><a href="https://www.asiaperspective.com/move-manufacturing-china-to-southeast-asia/">https://www.asiaperspective.com/move-manufacturing-china-to-southeast-asia/</a> (<i>Asia Perspective</i>, 18 July 2022)</p>
<ul style="list-style-type: none"> <li>• Apple is relocating Apple Watch and Mac production to Vietnam as part of a broader push to diversify its supply chain.</li> <li>• Vietnam has slowly been rising to be Apple’s most important manufacturing hub, due to the trade war.</li> <li>• Vietnam has become a key destination for manufacturing investment due to its strategic location and advantages in shipping, competitive labour, and production costs.</li> </ul>	<p><a href="https://techwireasia.com/2022/08/from-made-in-china-to-made-in-vietnam-apple-is-relocating-its-watch-macbook-production-to-sea/">https://techwireasia.com/2022/08/from-made-in-china-to-made-in-vietnam-apple-is-relocating-its-watch-macbook-production-to-sea/</a> (<i>Techwireasia</i>, 19 August 2022)</p>

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**Table 1 — cont'd**

<b>Company</b>	<b>Sector</b>	<b>Year</b>	<b>Former Production Site</b>	<b>New Production Site</b>
Brose	German Automotive Supplier	2022	China	Vietnam, Thailand
Lego	Denmark's Lego	2022	China	Vietnam
Google	Pixel Smartphone	2023	China	Vietnam
<b>Japanese/Korean firms (n = 6)</b>				
Fast Retailing	Apparel and garments	2018	China	Bangladesh, Vietnam

Notable Comments from Media Report	Source
<ul style="list-style-type: none"> <li>• Brose is considering moving its production plants from China to Vietnam or Thailand for three reasons               <ul style="list-style-type: none"> <li>– Chinese wages have risen in recent years.</li> <li>– China’s relationship with European governments deteriorated in 2021.</li> <li>– The ongoing zero-COVID policy in China increases the uncertainty of producing goods.</li> </ul> </li> </ul>	<p><a href="https://www.dw.com/en/why-more-european-firms-are-choosing-vietnam-over-china/a-62060983">https://www.dw.com/en/why-more-european-firms-are-choosing-vietnam-over-china/a-62060983</a> (<i>DW</i>, 6 August 2022)</p>
<ul style="list-style-type: none"> <li>• Denmark’s Lego announced to build a US\$1 billion (€935 million) factory near the southern business hub Ho Chi Minh City, one of the largest European investment projects in Vietnam to date.</li> </ul>	<p><a href="https://www.dw.com/en/why-more-european-firms-are-choosing-vietnam-over-china/a-62060983">https://www.dw.com/en/why-more-european-firms-are-choosing-vietnam-over-china/a-62060983</a> (<i>DW</i>, 6 August 2022)</p>
<ul style="list-style-type: none"> <li>• Google will make its Pixel smartphones in Vietnam for the first time in 2023 to reduce risks and dependence on China and avoid the risks from the ongoing U.S.-China trade tensions as well as China’s COVID-19 lockdowns.</li> </ul>	<p><a href="https://e.vnexpress.net/news/companies/google-to-produce-smartphone-in-vietnam-taiwanese-media-4485147.html">https://e.vnexpress.net/news/companies/google-to-produce-smartphone-in-vietnam-taiwanese-media-4485147.html</a> (<i>VNExpress</i>, 7 July 2022)</p>
<ul style="list-style-type: none"> <li>• Fast retailing shifted part of its production to Bangladesh and Vietnam because of rising wages in China.</li> </ul>	<p><a href="https://asia.nikkei.com/Business/Companies/Uniqlo-shifts-more-production-to-Southeast-Asia-from-China">https://asia.nikkei.com/Business/Companies/Uniqlo-shifts-more-production-to-Southeast-Asia-from-China</a> (<i>Nikkei</i>, 31 March 2018)</p>

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*Table 1 — cont'd*

<b>Company</b>	<b>Sector</b>	<b>Year</b>	<b>Former Production Site</b>	<b>New Production Site</b>
Kyocera	Consumer, enterprise electronics	2019	China	Vietnam
Nintendo	Gaming devices	2019	China	Vietnam
Konica Minolta	Printers	2019	China	Malaysia
Sharp	Consumer electronics	2020	China	Indonesia, Vietnam, Mexico
LG	Consumer electronics	2022	China	Indonesia

Notable Comments from Media Report	Source
<ul style="list-style-type: none"> <li>Chinese factories are used to produce for European markets.</li> <li>Vietnamese factories are used to serve the US market to avoid US tariffs.</li> </ul>	<a href="https://asia.nikkei.com/Business/Companies/Kyocera-shifts-China-production-to-Vietnam-to-avoid-Trump-tariffs">https://asia.nikkei.com/Business/Companies/Kyocera-shifts-China-production-to-Vietnam-to-avoid-Trump-tariffs</a> <i>(Nikkei, 3 August 2019)</i>
<ul style="list-style-type: none"> <li>Firm considered diversifying its production because of the US-China trade tension.</li> </ul>	<a href="https://www.businessinsider.com/nintendo-switch-production-vietnam-china-trump-trade-war-2019-7">https://www.businessinsider.com/nintendo-switch-production-vietnam-china-trump-trade-war-2019-7</a> <i>(Business Times, 9 July 2019)</i>
<ul style="list-style-type: none"> <li>Firm reduced its production in China by increasing its production in Malaysia.</li> </ul>	<a href="https://asia.nikkei.com/Economy/Trade-war/Konica-Minolta-to-boost-Malaysian-output-as-trade-war-rages">https://asia.nikkei.com/Economy/Trade-war/Konica-Minolta-to-boost-Malaysian-output-as-trade-war-rages</a> <i>(Nikkei, 13 June 2019)</i>
<ul style="list-style-type: none"> <li>Firm aims to diversify its supply chain away from China and seek lower production costs.</li> </ul>	<a href="https://vir.com.vn/sharp-to-relocate-to-vietnam-due-to-us-china-trade-war-69693.html">https://vir.com.vn/sharp-to-relocate-to-vietnam-due-to-us-china-trade-war-69693.html</a> <i>(VIR, 4 Aug 2019)</i>
<ul style="list-style-type: none"> <li>LG Corporation will invest more in the electric vehicle industry in Indonesia.</li> </ul>	<a href="https://dinsights.katadata.co.id/read/2022/08/01/lg-electronics-to-relocate-from-china-to-indonesia">https://dinsights.katadata.co.id/read/2022/08/01/lg-electronics-to-relocate-from-china-to-indonesia</a> <i>(Dinsights, 1 August 2022)</i>

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**Table 1 — cont'd**

<b>Company</b>	<b>Sector</b>	<b>Year</b>	<b>Former Production Site</b>	<b>New Production Site</b>
<b>Other Asian firms (n = 6)</b>				
ASUS (Taiwanese tech firm)	PC Components	2018	China	Vietnam
Zhejiang Hailide New Material	Chemicals (polyester producer)	2018	China	Vietnam
Pegatron	Original design manufacturer (ODM)	Trade war period	China	Indonesia, India, Vietnam

Notable Comments from Media Report	Source
<ul style="list-style-type: none"> <li>Firm considered moving its production from China to Vietnam.</li> </ul>	<a href="https://vietnamnet.vn/en/taiwanese-tech-giant-asus-ponders-vietnam-for-production-relocation-E213345.html#:~:text=Vietnam%20is%20among%20a%20list,made%20goods%2C%20reported%20AnandTech%20website">https://vietnamnet.vn/en/taiwanese-tech-giant-asus-ponders-vietnam-for-production-relocation-E213345.html#:~:text=Vietnam%20is%20among%20a%20list,made%20goods%2C%20reported%20AnandTech%20website</a> <i>(Vietnamnet, 22 November 2018)</i>
<ul style="list-style-type: none"> <li>Setting up additional production centres outside China to “stabilize supply”.</li> <li>Zhejiang Hailide New Material invested US\$155 million in a factory in Vietnam to serve the US market.</li> </ul>	<a href="https://vietnamnet.vn/en/taiwanese-tech-giant-asus-ponders-vietnam-for-production-relocation-E213345.html">https://vietnamnet.vn/en/taiwanese-tech-giant-asus-ponders-vietnam-for-production-relocation-E213345.html</a> <i>(Vietnamnet, 22 November 2018)</i>
<ul style="list-style-type: none"> <li>Moved production from China to Indonesia and Vietnam due to high labour costs and the US-China trade dispute.</li> </ul>	<a href="https://asia.nikkei.com/Business/Technology/Pegatron-to-open-Indonesia-and-Vietnam-plants-as-China-costs-rise">https://asia.nikkei.com/Business/Technology/Pegatron-to-open-Indonesia-and-Vietnam-plants-as-China-costs-rise</a> <i>(NIKKEI Asia, 27 January 2020)</i>

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*Table 1 — cont'd*

<b>Company</b>	<b>Sector</b>	<b>Year</b>	<b>Former Production Site</b>	<b>New Production Site</b>
Li & Fung	Consumer goods, retail	2019	China	Diversified across SEA
Foxconn		2022	China	Malaysia
Taiwan-based PC developer Acer		2022	China	SEA and others

*Source:* Authors' compilation from media reports.

Notable Comments from Media Report	Source
<ul style="list-style-type: none"> <li>Firm diversified production away from China because of rising labour costs and high US tariffs on Chinese goods, and in China.</li> </ul>	<a href="https://www.scmp.com/business/investor-relations/stock-quote-profile/article/3002719/li-fung-cuts-chinas-role-supply">https://www.scmp.com/business/investor-relations/stock-quote-profile/article/3002719/li-fung-cuts-chinas-role-supply</a> ( <i>SMCP</i> , 21 March 2019)
<ul style="list-style-type: none"> <li>Given China’s reinstated lockdowns in major cities, Foxconn Technology signed an agreement with its Malaysian partner Dagang NeXchange to set up a factory for producing electric vehicles.</li> </ul>	<a href="https://www.voanews.com/a/southeast-asia-latin-america-set-to-gain-in-post-pandemic-supply-chains/6628941.html">https://www.voanews.com/a/southeast-asia-latin-america-set-to-gain-in-post-pandemic-supply-chains/6628941.html</a> ( <i>VOA News</i> , 22 June 2022)
<ul style="list-style-type: none"> <li>Firm aims to diversify its supply chains to Southeast Asian countries.</li> </ul>	<a href="https://www.voanews.com/a/southeast-asia-latin-america-set-to-gain-in-post-pandemic-supply-chains/6628941.html">https://www.voanews.com/a/southeast-asia-latin-america-set-to-gain-in-post-pandemic-supply-chains/6628941.html</a> ( <i>VOA News</i> , 22 June 2022)

### 3. RISK LEVELS OF ASEAN’S GLOBAL VALUE CHAINS

This section analyses the risk of ASEAN GVCs associated with supplier and buyer market concentration.<sup>3</sup> A sector is classified as “high risk” to the vulnerability of foreign suppliers (upstream GVCs) if it substantially relies on foreign inputs from a few foreign suppliers. In contrast, a sector is classified as “low risk” if it relies on a moderate share of foreign inputs in producing goods for exports, and such foreign inputs are sourced from a large number of foreign suppliers. Similarly, a sector is classified as “high risk” to the vulnerability of foreign buyers (downstream GVCs) if it sells a large share of its outputs to a few foreign buyers. On the contrary, a sector is classified as “low risk” if its sales rely on a moderate share of its outputs to a large number of foreign buyers. See Annex 1 for the methodology for calculating risks of supplier and buyer market concentration.

The risk assessments reveal that 45 out of 315 sectors in ASEAN GVCs—mainly in mining and quarrying; textiles; leather, leather products, and footwear; basic metals and fabricated metal; transport equipment; retail trade—are highly vulnerable to external shocks associated with both supplier and buyer market concentrations. These sectors substantially rely on foreign intermediate inputs from a limited number of suppliers to produce goods for export to a limited number of foreign buyers. More than 90 per cent of these high-risk sectors are accounted for by Cambodia, Laos, Brunei, Indonesia, the Philippines, and Thailand.

When analysing the risks of supplier and buyer market concentration separately, the number of high-risk industries associated with supplier market concentration in ASEAN is greater than those of buyer market concentration. This reinforces the need to strengthen the resilience of global and regional supply chains in ASEAN.

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<sup>3</sup> ASEAN-Japan Centre (2020) applies the same methodology for the risk assessment of GVCs.

### **3.1 Sectoral Vulnerability of ASEAN GVCs**

Forty-five out of 315 sectors in ASEAN GVCs significantly rely on intermediate inputs from a limited number of foreign suppliers, and export their intermediate products to a limited number of foreign buyers. These sectors face the high risk of both supplier and buyer market concentration (Table 2). Forty-two out of forty-five high-risk sectors are accounted for by Cambodia, Laos, Brunei, Indonesia, the Philippines, and Thailand. These are largely concentrated in mining and quarrying; textiles; leather, leather products, and footwear; basic metals and fabricated metal; transport equipment; electricity, gas, and water supply; retail trade; education; and health and social work. Malaysia and Vietnam face the high risk of both supplier and buyer market concentration in electricity, gas, and water supply, while Singapore faces high risks in the education sector.

The risk level of ASEAN GVCs stems from the upstream part rather than the downstream part of the GVCs. When analysing the risks of supplier and buyer market concentration separately, the number of high-risk industries associated with supplier market concentration in ASEAN is greater than those of buyer market concentration. There are 114 out of 315 industries that face the high risk of supplier market concentration; 85 of these industries are accounted by Cambodia (23), Brunei (20), Vietnam (18), Laos (12), and Thailand (12). Such a risk concentrates in six sectors, namely mining and quarrying; textiles and textile products; other non-metallic minerals; electricity, gas, and water supply; education; and health and social work. Singapore faces the high risk of foreign suppliers in nine industries, namely agriculture, hunting, forestry, and fishing; food, beverages, and tobacco; wood and products of wood and cork; other non-metallic minerals; electricity, gas, and water supply; sale, maintenance, and repair of motor vehicles and motorcycles; air transport; financial intermediation; and education.

Ninety-three industries in ASEAN face the high risk associated with buyer market concentration. Eighty of these are accounted for by Laos (23), Indonesia (19), Cambodia (14), the Philippines (14), and Brunei (10). The risks are concentrated in agriculture, hunting, forestry, and fishing; mining and quarrying; textiles and textile products; wood and

**Table 2: Risk Intensity of Supplier and Buyer Market Concentrations for ASEAN, 2021**

No.	Sector	Risk Intensity Score					
		Suppliers					
		BRN	CAM	IDN	LAO	MYS	PHP
1	Agriculture, hunting, forestry, and fishing	100	10	5	10	1	5
2	Mining and quarrying	50	50	5	50	5	50
3	Food, beverages, and tobacco	50	50	1	10	5	1
4	Textiles and textile products	50	100	100	1	1	50
5	Leather, leather products, and footwear	1	1	100	1	5	50
6	Wood and products of wood and cork	100	50	1	10	10	10
7	Pulp, paper, paper products, printing, and publishing	50	100	10	10	10	1
8	Coke, refined petroleum, and nuclear fuel	5	1	1	10	1	50
9	Chemicals and chemical products	100	50	1	10	25	25
10	Rubber and plastics	25	100	5	10	5	1
11	Other non-metallic minerals	100	100	1	10	100	50
12	Basic metals and fabricated metal	25	50	10	50	50	50
13	Machinery, nec	1	50	5	10	10	10
14	Electrical and optical equipment	25	50	1	5	50	50
15	Transport equipment	50	100	1	100	10	5
16	Manufacturing, nec; recycling	50	100	5	10	50	25
17	Electricity, gas, and water supply	100	100	100	10	50	10
18	Construction	10	100	5	100	10	25
19	Sale, maintenance, and repair of motor vehicles and motorcycles; retail sale of fuel	100	1	10	50	5	10
20	Wholesale trade and commission trade, except for motor vehicles and motorcycles	100	50	10	50	10	1

Risk Intensity Score											
			Buyers								
SGP	THA	VNM	BRN	CAM	IDN	LAO	MYS	PHP	SGP	THA	VNM
50	50	50	10	50	10	100	5	50	5	25	5
1	50	50	50	50	50	50	50	100	1	1	5
50	5	10	5	5	10	100	5	10	25	5	1
10	25	100	50	10	50	10	10	100	1	5	10
5	5	100	1	1	50	10	5	100	5	10	10
100	10	50	10	50	10	100	5	100	10	50	5
10	1	50	25	10	100	100	5	5	1	10	5
10	50	5	50	1	10	50	10	50	1	5	5
10	25	50	10	50	10	100	25	10	1	25	5
5	5	50	10	10	10	50	10	5	5	10	1
50	10	10	10	50	10	100	10	25	25	1	5
10	10	10	50	100	100	100	25	5	5	1	1
10	10	50	1	5	10	100	5	10	5	5	1
5	25	50	25	50	10	50	5	5	5	50	5
25	5	50	50	100	10	10	1	10	25	5	5
10	5	100	5	50	50	100	5	50	5	5	10
100	100	50	50	10	50	100	50	100	10	10	100
10	50	10	1	50	50	50	5	50	10	5	1
100	10	50	50	1	100	100	5	50	10	1	5
10	5	5	10	5	100	100	5	10	1	5	5

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**Table 2 — cont'd**

No.	Sector	Risk Intensity Score					
		Suppliers					
		BRN	CAM	IDN	LAO	MYS	PHP
21	Retail trade, except for motor vehicles and motorcycles; repair of household goods	100	50	50	50	10	1
22	Hotels and restaurants	100	10	1	1	25	5
23	Inland transport	10	50	5	10	10	5
24	Water transport	5	1	5	100	5	25
25	Air transport	50	1	1	50	5	25
26	Other supporting and auxiliary transport activities; activities of travel agencies	10	1	10	10	5	25
27	Post and telecommunications	10	10	1	1	5	1
28	Financial intermediation	100	10	5	50	10	5
29	Real estate activities	10	10	1	1	10	5
30	Renting of machinery and equipment and other business activities	50	50	5	1	50	1
31	Public administration and defence; compulsory social security	10	100	10	50	50	10
32	Education	10	100	100	50	10	5
33	Health and social work	50	100	50	1	10	1
34	Other community, social, and personal services	50	100	5	1	25	25
35	Private households with employed persons	1	1	1	1	1	1
	<b>Memo: number of sectors</b>						
	High-risk sectors	20	23	6	12	7	7
	Medium-risk sectors	3	0	0	0	3	7
	Low-risk sectors	12	12	29	23	25	21

*Note:* The table shows the score for risk intensity associated with supplier and buyer market concentration as of 2021. Colours refer to the level of risks associated with foreign supplier and buyer market concentrations: ■ = high risk (score of 50–100); ■ = medium risk (score of 25–50); ■ = low risk (score below 25).

*Source:* Authors' calculation based on ADB's MRIO.

Risk Intensity Score											
			Buyers								
SGP	THA	VNM	BRN	CAM	IDN	LAO	MYS	PHP	SGP	THA	VNM
10	10	1	50	5	100	100	5	10	1	5	1
10	5	10	10	5	10	100	25	10	5	5	1
5	50	100	1	5	50	10	5	5	10	25	5
10	100	10	25	1	50	10	50	50	1	50	25
50	50	10	10	1	10	5	10	50	5	25	5
10	50	25	5	1	50	1	5	10	5	25	50
10	5	10	1	5	10	10	5	10	1	5	1
50	25	50	50	100	50	50	1	50	1	25	5
10	10	10	5	1	10	100	5	10	5	5	1
10	10	10	5	5	10	5	25	10	1	10	5
10	100	10	1	10	100	100	25	100	1	50	5
100	100	100	1	50	100	100	5	10	50	10	10
25	100	50	5	50	100	1	5	10	50	50	5
10	5	10	50	50	50	1	50	25	1	10	1
1	1	1	1	1	1	1	1	1	1	1	1
9	12	18	10	14	19	23	4	14	2	5	2
2	4	1	3	0	0	0	5	2	3	6	1
24	19	16	22	21	16	12	26	19	30	24	32



products of wood and cork; coke, refined petroleum, and nuclear fuel; basic metals and fabricated metal; electrical and optical equipment; transport equipment; electricity, gas, and water supply; construction; sale, maintenance, and repair of motor vehicles and motorcycles; retail sale of fuel; water transport; and financial intermediation. In Singapore, the high risk of buyer market concentration occurs in education and health and social work, and the medium risk is in food and transport equipment.

### *3.1.1 Sectoral Vulnerability of ASEAN's Upstream GVCs*

Forty-four out of 315 sectors in ASEAN's upstream GVCs face the high risk of both backward integration and supplier concentration (Table 3). These are highest in Cambodia (12), followed by Brunei (10), Thailand (5), Vietnam (5), Indonesia (4), Singapore (4), Laos (3), and Malaysia (1). The number of high-risk sectors increases when the risk of backward integration and supplier concentration are considered separately.

#### Brunei

The high-risk sectors associated with both backward integration and supplier concentration are largely in the business services sector (e.g., sale, maintenance, and repair of motor vehicles and motorcycles; wholesale trade; retail trade; hotels and restaurants; financial intermediation), followed by the low-technology manufacturing sector (e.g., wood and products of wood and cork; electricity, gas, and water supply), the medium- to high-technology manufacturing sector (e.g., chemicals and chemical products; non-metallic minerals), and the primary sector (e.g., agriculture, hunting, forestry, and fishing).

When analysing the risk of backward integration and supplier concentration separately, the number of high-risk sectors increases from 11 to 22 for the backward integration and 15 for the supplier concentration. The additional high-risk sectors associated with the backward integration include four low-technology manufacturing sectors (e.g., food, beverages, and tobacco; pulp, paper, paper products, printing, and publishing; construction; recycling), five business services sectors

(e.g., inland transport; air transport; activities of travel agencies; post and telecommunications; renting of machinery and equipment and other business activities, and three personal and public services (e.g., public administration and defence; education; health and social work). The additional high-risk sectors associated with the supplier concentration include one primary sector (e.g., mining and quarrying), one low-technology manufacturing sector (e.g., textiles and textile products), one medium- to high-technology sector (e.g., transport equipment), one business services sector (e.g., real estate activities), and one personal and public services sector (e.g., other community, social, and personal services).

## Cambodia

The high-risk sectors associated with both backward integration and supplier concentration are the low-technology manufacturing sector (e.g., textiles and textile products; pulp, paper, paper products, printing, and publishing; rubber and plastics; electricity, gas, and water supply; and construction), and the personal and public services sector (e.g., public administration and defence; education; health and social work; other community, social, and personal services), and the medium- to high-technology manufacturing sector (e.g., non-metallic minerals; transport equipment).

The number of high-risk sectors in Cambodia increases from 12 to 21 for the backward integration and 19 for the supplier concentration. The additional high-risk sectors associated with backward integration include one low-technology manufacturing sector (e.g., food, beverages, and tobacco), one medium- to high-technology sector (e.g., machinery), and seven business services (e.g., wholesale trade; retail trade; hotels and restaurants; inland transport; post and telecommunications; real estate activities; renting of machinery and equipment). The additional high-risk sectors associated with the supplier concentration include two primary sectors (e.g., agriculture, hunting, forestry, and fishing; mining and quarrying) and three medium- to high-technology sectors (e.g., chemicals and chemical products; basic metals and fabricated metal; electrical and optical equipment).

**Table 3: Vulnerability of ASEAN's Upstream GVCs to External Shocks, 2021**

No.	Sector	Degree of Backward Integration (FVA Share in Gross Exports)					
		BRN	CAM	IDN	LAO	MYS	PHP
1	Agriculture, hunting, forestry, and fishing	45.0	8.3	2.0	3.1	9.9	6.2
2	Mining and quarrying	12.6	14.5	3.0	10.2	4.9	9.2
3	Food, beverages, and tobacco	62.4	37.7	7.0	11.1	25.1	10.5
4	Textiles and textile products	30.1	50.9	41.6	17.6	22.6	24.3
5	Leather, leather products, and footwear	0.0	0.0	47.6	16.5	35.1	31.3
6	Wood and products of wood and cork	27.5	19.6	6.9	7.2	21.1	14.0
7	Pulp, paper, paper products, printing, and publishing	26.0	24.0	9.6	7.7	25.8	13.7
8	Coke, refined petroleum, and nuclear fuel	10.9	0.0	4.6	14.0	15.0	35.9
9	Chemicals and chemical products	31.7	23.2	11.6	11.0	26.8	20.7
10	Rubber and plastics	25.0	57.5	15.8	19.6	20.9	17.8
11	Other non-metallic minerals	37.1	26.5	11.6	13.8	43.0	29.9
12	Basic metals and fabricated metal	20.8	19.2	10.9	23.8	32.0	33.1
13	Machinery, nec	0.0	46.4	31.3	16.7	48.0	40.4
14	Electrical and optical equipment	30.6	29.9	23.6	22.9	41.2	36.5
15	Transport equipment	34.8	43.2	13.2	40.9	42.7	27.3
16	Manufacturing, nec; recycling	91.6	41.9	16.4	14.9	42.7	26.9
17	Electricity, gas, and water supply	35.0	62.8	24.0	6.1	23.8	13.6
18	Construction	44.7	27.7	8.4	34.0	29.6	18.2
19	Sale, maintenance, and repair of motor vehicles and motorcycles; retail sale of fuel	24.2	0.0	7.0	11.8	16.9	5.6
20	Wholesale trade and commission trade, except for motor vehicles and motorcycles	28.3	20.8	5.6	7.2	14.6	5.8

			Degree of Supplier Concentration (HHI)								
SGP	THA	VNM	BRN	CAM	IDN	LAO	MYS	PHP	SGP	THA	VNM
23.6	10.3	33.3	2,696	6,394	1,574	4,431	1,061	2,391	2,448	2,942	1,954
0.0	32.1	24.0	2,858	5,897	1,735	8,910	2,152	6,668	0	1,678	2,101
37.3	25.1	45.0	2,436	1,607	1,095	3,076	973	1,239	1,865	957	1,354
42.3	24.5	57.7	5,704	2,606	3,231	1,165	1,250	3,663	1,406	1,683	3,453
27.6	19.6	61.0	0	0	2,727	1,239	947	5,535	1,421	1,446	3,090
26.3	14.6	36.1	5,046	7,656	1,125	3,169	1,112	6,867	3,416	3,057	1,785
35.1	9.3	32.7	2,205	3,403	2,981	9,648	1,148	873	1,232	1,096	1,701
58.5	47.2	33.5	2,316	0	1,478	6,664	1,445	3,067	1,071	1,659	1,350
29.7	29.1	34.7	8,671	3,879	1,450	2,965	1,669	2,033	1,113	1,709	2,086
20.5	16.4	37.2	1,875	6,797	1,692	3,333	1,143	1,207	771	1,524	1,601
43.1	58.2	26.0	4,714	2,680	1,186	8,187	3,967	2,496	1,911	780	1,376
31.4	39.8	46.0	2,492	3,232	3,734	4,286	1,948	2,282	1,349	1,004	1,143
39.3	39.5	58.4	0	1,739	677	4,400	1,027	794	1,150	682	1,503
32.6	30.8	50.5	1,540	5,537	1,158	2,036	1,982	1,660	908	2,131	2,190
40.3	39.9	50.1	4,883	2,550	1,151	3,827	1,350	1,534	2,280	859	1,760
39.2	31.7	44.3	2,474	6,781	1,822	3,077	1,815	1,831	1,266	1,014	3,656
37.8	25.1	18.5	7,868	10,000	4,802	7,597	4,510	5,599	3,185	3,079	4,323
27.1	39.8	40.1	1,095	6,478	1,955	6,241	1,301	1,679	1,479	2,473	946
37.2	29.4	21.0	3,256	0	3,820	6,643	766	4,063	3,453	1,356	1,565
34.6	9.7	12.6	3,256	2,139	3,419	6,546	818	1,035	1,486	1,361	1,341

*continued on next page*

**Table 3 — cont'd**

No.	Sector	Degree of Backward Integration (FVA Share in Gross Exports)					
		BRN	CAM	IDN	LAO	MYS	PHP
21	Retail trade, except of motor vehicles and motorcycles; repair of household goods	14.7	22.6	6.0	9.5	14.5	4.7
22	Hotels and restaurants	37.0	19.8	8.9	0.0	17.4	11.6
23	Inland transport	24.3	24.5	10.9	21.1	20.8	19.0
24	Water transport	17.8	0.0	9.2	32.6	12.8	12.0
25	Air transport	89.2	0.0	14.5	42.7	24.2	29.2
26	Other supporting and auxiliary transport activities; activities of travel agencies	23.0	0.0	3.1	25.8	11.1	9.4
27	Post and telecommunications	23.5	15.6	5.8	6.7	12.7	9.8
28	Financial intermediation	12.1	3.6	3.4	6.3	11.3	3.2
29	Real estate activities	2.0	8.7	2.1	0.0	8.8	3.0
30	Renting of machinery and equipment, and other business activities	25.3	15.3	7.3	0.0	17.6	4.3
31	Public administration and defence; compulsory social security	18.8	21.3	4.1	6.3	14.2	3.4
32	Education	23.5	13.8	8.3	4.9	10.1	4.5
33	Health and social work	30.0	20.8	11.1	0.0	17.2	8.9
34	Other community, social, and personal services	11.6	14.6	3.3	0.0	11.1	11.4
35	Private households with employed persons	0.0	0.0	0.0	0.0	0.0	0.0
	<b>Memo: number of sectors</b>						
	High-risk sectors	22	21	4	6	18	4
	Medium-risk sectors	8	5	4	8	12	15
	Low-risk sectors	5	9	27	21	5	16

*Note:* The table shows the score for risk intensity associated with supplier market concentration as of 2021. Colours refer to the level of risks associated with foreign supplier market concentrations: ■ = high risk (score of 50–100); ■ = medium risk (score of 25–50); ■ = low risk (score below 25). HHI = Herfindahl-Hirschman index.

*Source:* Authors' calculation based on ADB's MRIO.

			Degree of Supplier Concentration (HHI)								
SGP	THA	VNM	BRN	CAM	IDN	LAO	MYS	PHP	SGP	THA	VNM
16.6	12.6	0.0	3,212	2,207	3,639	6,482	805	1,109	1,204	1,377	0
20.6	13.5	29.4	3,556	1,208	1,192	0	1,588	1,383	1,406	1,416	1,338
16.3	19.4	38.7	1,338	1,635	1,632	1,137	904	1,414	997	2,666	2,651
53.7	26.3	25.7	1,304	0	2,475	4,383	1,350	2,078	1,397	3,146	1,032
41.9	38.1	42.2	1,946	0	1,011	2,054	1,373	1,677	1,541	2,133	1,203
17.8	11.6	10.6	769	0	2,800	804	952	1,500	695	3,497	2,088
34.3	11.5	33.8	1,470	1,058	1,252	990	593	1,029	963	940	1,209
22.4	5.3	12.2	5,885	7,683	2,040	3,926	900	2,167	1,570	1,690	1,730
10.3	10.6	15.5	5,556	1,316	1,266	0	1,157	1,203	1,480	822	1,341
33.4	12.5	15.8	1,815	1,516	1,356	0	1,681	1,396	1,054	1,073	1,487
20.7	11.3	15.6	1,099	4,130	3,529	5,200	1,764	4,250	798	3,675	881
9.9	14.2	14.7	1,378	3,958	3,593	5,200	1,103	945	2,734	3,589	2,506
13.4	18.4	38.8	2,447	4,020	4,630	0	1,076	1,277	1,755	3,866	2,415
17.7	9.4	21.2	4,309	10,000	2,304	0	1,953	2,083	1,221	950	1,214
0.0	0.0	0.0	0	0	0	0	0	0	0	0	0
27	16	29	15	19	12	22	2	8	4	9	6
6	15	4	10	6	9	2	9	13	7	9	13
2	4	2	10	10	14	11	24	14	24	17	16

## Indonesia

The high-risk sectors associated with both backward integration and supplier concentration are in the low-technology manufacturing sector (e.g., textiles and textile products; leather, leather products, and footwear; electricity, gas, and water supply) and the personal and public services sector (e.g., education).

The number of high-risk sectors increases from 4 to 12 for the supplier concentration. The additional high-risk sectors associated with the supplier concentration include four business services sectors (e.g., sale, maintenance, and repair of motor vehicles and motorcycles; wholesale trade; retail trade; supporting and auxiliary transport activities), two personal and public services sectors (e.g., public administration and defence; health and social work), one low-technology manufacturing sector (e.g., pulp, paper, paper products, printing, and publishing), and one medium- to high-technology manufacturing sector (e.g., basic metals and fabricated metal). There is no additional high-risk sector associated with backward integration.

## Laos

The high-risk sectors associated with both backward integration and supplier concentration are transport equipment, construction, and water transport. The number of high-risk sectors increases from 3 to 6 for the backward integration and 22 for the supplier concentration. The additional high-risk sectors associated with the backward integration include three business services sectors, namely inland transport; air transport; and supporting and auxiliary transport activities.

The additional high-risk sectors associated with the supplier concentration include six low-technology manufacturing sectors (e.g., food, beverages, and tobacco; wood and products of wood and cork; pulp, paper, paper products, printing, and publishing; rubber and plastics; recycling; electricity, gas, and water supply), five medium- to high-technology manufacturing sectors (e.g., coke, refined petroleum, and nuclear fuel; chemicals and chemical products; non-metallic minerals; basic metals and fabricated metal; machinery), four business services sectors (e.g., sale, maintenance, and repair of motor vehicles and

motorcycles; wholesale trade; retail trade; financial intermediation), two primary sectors (e.g., agriculture, hunting, forestry, and fishing; mining and quarrying), and two personal and public services sectors (e.g., public administration and defence; education).

## Malaysia

Malaysia has only one high-risk sector associated with both backward integration and supplier concentration. This is the non-metallic minerals. However, the number of high-risk sectors increases from 1 to 18 when considering only the risk associated with backward integration. The additional high-risk sectors associated with backward integration include six business services sectors (e.g., wholesale trade; retail trade; inland transport; financial intermediation; real estate activities; renting of machinery and equipment), four low-technology manufacturing sectors (e.g., wood and products of wood and cork; pulp, paper, paper products, printing, and publishing; recycling; construction), four medium- to high-technology manufacturing sectors (e.g., basic metals and fabricated metal; machinery; electrical and optical equipment; transport equipment), and three personal and public services sectors (e.g., public administration and defence; education; health and social work). There is no additional high-risk sector associated with the supplier concentration.

## The Philippines

The Philippines is the only ASEAN country where there is no sector facing the high risk of both backward integration and supplier concentration. However, there are four high-risk sectors associated with backward integration and eight high-risk sectors associated with supplier concentration. The high-risk sectors associated with the backward integration concentrate in the medium- to high-technology manufacturing sectors such as non-metallic minerals; basic metals and fabricated metal; machinery; and electrical and optical equipment.

The high-risk sectors associated with the supplier concentration include four low-technology manufacturing sectors (e.g., textiles and textile products; leather, leather products, and footwear; wood and products of wood and cork; electricity, gas, and water supply), one



medium- to high-technology manufacturing sector (e.g., coke, refined petroleum, and nuclear fuel), one business services sector (e.g., sale, maintenance, and repair of motor vehicles and motorcycles), one personal and public services sector (e.g., public administration and defence), and one primary sector (e.g., mining and quarrying).

### Singapore

The high-risk sectors associated with both backward integration and supplier concentration are in the low-technology manufacturing sector (e.g., wood and products of wood and cork; electricity, gas, and water supply), the business services sector (e.g., sale, maintenance, and repair of motor vehicles and motorcycles), and the personal and public services sector (e.g., education).

The number of high-risk sectors increases from 4 to 27 for the backward integration. The additional high-risk sectors associated with the backward integration include 10 business services sectors (e.g., wholesale trade; retail trade; hotels and restaurants; water transport; air transport; supporting and auxiliary transport activities; post and telecommunications; financial intermediation; real estate activities; renting of machinery and equipment), five medium- to high-technology manufacturing sectors (e.g., coke, refined petroleum, and nuclear fuel; chemicals and chemical products; non-metallic minerals; basic metals and fabricated metal; machinery), five low-technology manufacturing sectors (e.g., food, beverages, and tobacco; textiles and textile products; pulp, paper, paper products, printing, and publishing; recycling; construction), two personal and public services sectors (e.g., public administration and defence; community, social, and personal services), and one primary sector (e.g., agriculture, hunting, forestry, and fishing). There is no additional high-risk sector associated with the supplier concentration.

### Thailand

The high-risk sectors associated with both backward integration and supplier concentration are in the personal and public services sector (e.g., public administration and defence; education; health and social work), the low-technology manufacturing sector (e.g., electricity, gas, and water supply), and the business services sector (e.g., water transport).

The number of high-risk sectors increases from 5 to 16 for the backward integration and 9 for the supplier concentration. The additional high-risk sectors associated with the backward integration include five business services sectors (e.g., sale, maintenance, and repair of motor vehicles and motorcycles; retail trade; air transport; real estate activities; renting of machinery and equipment), four medium- to high-technology manufacturing sectors (e.g., coke, refined petroleum, and nuclear fuel; non-metallic minerals; basic metals and fabricated metal; machinery), one primary sector (e.g., mining and quarrying), and one low-technology manufacturing sector (e.g., construction). The additional high-risk sectors associated with the supplier concentration include two business services sectors (e.g., inland transport; supporting and auxiliary transport activities), one primary sector (e.g., agriculture, hunting, forestry, and fishing), and one low-technology manufacturing sector (e.g., wood and products of wood and cork).

### Vietnam

The high-risk sectors associated with both backward integration and supplier concentration are the low-technology manufacturing sector (e.g., textiles and textile products; leather, leather products, and footwear; recycling), the personal and public services sector (e.g., education), and the business services sector (e.g., inland transport).

The number of high-risk sectors increases from 5 to 29 for the backward integration and 6 for the supplier concentration. The additional high-risk sectors associated with the backward integration include eight business services sectors (e.g., sale, maintenance, and repair of motor vehicles and motorcycles; hotels and restaurants; water transport; air transport; post and telecommunications; financial intermediation; real estate activities; renting of machinery and equipment), six medium- to high-technology manufacturing sectors (e.g., chemicals and chemical products; non-metallic minerals; basic metals and fabricated metal; machinery; electrical and optical equipment; transport equipment), five low-technology manufacturing sectors (e.g., food, beverages, and tobacco; wood and products of wood and cork; pulp, paper, paper products, printing, and publishing; rubber and plastics; construction), three personal and public services sectors (e.g., public administration

and defence; health and social work; community, social, and personal services), and two primary sectors (e.g., agriculture, hunting, forestry, and fishing; mining and quarrying). The additional high-risk sectors associated with the supplier concentration consist of only electricity, gas, and water supply.

### *3.1.2 Sectoral Vulnerability of ASEAN's Downstream GVCs*

Thirty-five out of 315 sectors in ASEAN's downstream GVCs face the high risk of both forward integration and buyer concentration (Table 4). These are highest in Laos (17 sectors), followed by Indonesia (8), the Philippines (6), Brunei (3), and Vietnam (1). The number of high-risk sectors increases when considering the risk of forward integration and buyer concentration separately.

#### Brunei

Brunei has only the coke, refined petroleum, and nuclear fuel sector that faces the high risk of forward integration, while it has 17 sectors that face the high risk of buyer concentration. These include four low-technology manufacturing sectors (e.g., textiles and textile products; wood and products of wood and cork; rubber and plastics; electricity, gas, and water supply), four medium- to high-technology manufacturing sectors (e.g., chemicals and chemical products; non-metallic minerals; basic metals and fabricated metal; transport equipment), six business services sectors (e.g., sale, maintenance, and repair of motor vehicles and motorcycles; wholesale trade; retail trade; hotels and restaurants; air transport; financial intermediation), two primary sectors (e.g., agriculture, hunting, forestry, and fishing; mining and quarrying), and one personal public services sector (e.g., community, social, and personal services).

#### Cambodia

The high-risk sectors associated with both forward integration and buyer concentration are in the medium- to high-technology manufacturing sector (e.g., basic metals and fabricated metal; transport equipment) and the business services sector (e.g., financial intermediation).

The number of high-risk sectors increases from 3 to 4 for the forward integration and 18 for the buyer concentration. The additional high-risk sector associated with the forward integration is the non-metallic minerals sector. The additional high-risk sectors associated with the buyer concentration include seven low-technology manufacturing sectors (e.g., textiles and textile products; wood and products of wood and cork; pulp, paper, paper products, printing, and publishing; rubber and plastics; recycling; electricity, gas, and water supply; construction), two medium- to high-technology manufacturing sectors (e.g., chemicals and chemical products; electrical and optical equipment), two primary sectors (e.g., agriculture, hunting, forestry, and fishing; mining and quarrying), and four personal and public services sectors (e.g., public administration and defence; compulsory social security; education; health and social work; other community, social, and personal services).

## Indonesia

The high-risk sectors associated with both forward integration and buyer concentration are in the low-technology manufacturing sector (e.g., pulp, paper, paper products, printing, and publishing), medium- to high-technology manufacturing sector (e.g., basic metals and fabricated metal), business services sector (e.g., sale, maintenance, and repair of motor vehicles and motorcycles; wholesale trade; retail trade), and personal and public services sector (e.g., public administration and defence; education; health and social work).

The number of high-risk sectors increases from 8 to 31 for the forward integration and 11 for the buyer concentration. The additional high-risk sectors associated with the forward integration include five low-technology manufacturing sectors (e.g., food, beverages, and tobacco; wood and products of wood and cork; rubber and plastics; recycling; construction), six medium- to high-technology manufacturing sectors (e.g., coke, refined petroleum, and nuclear fuel; chemicals and chemical products; non-metallic minerals; machinery; electrical and optical equipment; transport equipment), two primary sectors (e.g., agriculture, hunting, forestry, and fishing; mining and quarrying), nine business services sectors (e.g., hotels and restaurants; inland transport; water

**Table 4: Vulnerability of ASEAN's Downstream GVCs to External Shocks, 2021**

No.	Sector	Degree of Forward Integration (DVX Share in Gross Exports)					
		BRN	CAM	IDN	LAO	MYS	PHP
1	Agriculture, hunting, forestry, and fishing	49.2	83.3	97.1	94.9	86.5	92.8
2	Mining and quarrying	80.2	79.9	94.7	84.2	91.4	84.8
3	Food, beverages, and tobacco	33.7	59.4	90.8	85.0	67.0	87.0
4	Textiles and textile products	68.9	47.9	54.2	82.0	69.1	74.3
5	Leather, leather products, and footwear	0.0	0.0	51.0	81.9	55.4	68.3
6	Wood and products of wood and cork	51.9	76.1	90.6	87.6	71.2	83.8
7	Pulp, paper, paper products, printing, and publishing	56.2	54.7	84.0	88.0	61.5	79.2
8	Coke, refined petroleum, and nuclear fuel	84.3	0.0	90.6	70.0	73.1	39.4
9	Chemicals and chemical products	52.9	63.7	80.1	76.7	59.6	74.3
10	Rubber and plastics	28.1	33.8	76.7	62.5	66.1	65.3
11	Other non-metallic minerals	35.6	66.3	84.7	77.2	40.4	64.1
12	Basic metals and fabricated metal	50.4	61.5	80.9	54.1	48.4	43.7
13	Machinery, nec	0.0	32.1	62.3	80.0	43.3	54.4
14	Electrical and optical equipment	49.8	58.2	65.9	67.4	38.0	44.0
15	Transport equipment	51.1	56.1	84.5	36.4	47.0	62.9
16	Manufacturing, nec; recycling	7.7	55.6	82.2	81.9	53.7	70.8
17	Electricity, gas, and water supply	64.9	37.1	76.0	89.9	74.0	86.3
18	Construction	39.1	64.1	88.3	54.4	62.9	73.5
19	Sale, maintenance, and repair of motor vehicles and motorcycles; retail sale of fuel	71.1	0.0	90.9	82.9	80.8	83.1
20	Wholesale trade and commission trade, except for motor vehicles and motorcycles	62.3	73.8	92.0	90.3	80.3	91.8

			Degree of Buyer Concentration (HHI)								
SGP	THA	VNM	BRN	CAM	IDN	LAO	MYS	PHP	SGP	THA	VNM
70.2	86.3	59.9	2,734	7,631	1,440	3,569	997	1,981	2,070	2,382	1,798
0.0	52.7	58.9	2,575	4,931	1,573	8,666	1,974	6,527	0	1,451	2,066
60.0	72.9	53.5	2,386	1,576	983	2,822	951	1,200	1,692	903	1,353
50.1	68.8	37.5	5,559	2,519	2,759	1,122	966	3,340	1,272	1,341	3,089
61.0	70.4	34.9	0	0	2,612	1,161	816	5,464	1,436	1,287	2,832
64.6	79.3	53.8	5,766	7,075	1,043	2,885	976	6,981	2,834	3,197	1,796
51.2	85.1	53.1	2,101	3,777	2,795	9,679	1,229	772	1,207	1,053	1,653
19.6	24.4	50.0	2,444	0	1,313	6,929	1,382	3,157	998	1,903	1,182
51.8	55.2	44.2	7,875	4,141	1,262	3,074	1,530	1,491	934	1,641	2,079
62.1	76.3	41.8	2,593	6,353	1,396	3,814	880	1,201	725	1,225	1,308
40.6	30.8	64.1	5,508	2,472	1,094	8,684	4,169	2,379	1,792	710	1,317
50.9	40.0	27.8	3,706	3,355	3,066	4,458	1,755	1,993	1,251	883	982
53.8	52.2	30.9	0	1,860	638	2,674	947	812	1,028	653	1,388
54.2	59.2	28.2	1,830	4,200	1,108	1,713	1,661	1,577	900	2,028	2,493
51.8	54.1	34.7	4,803	2,503	1,014	3,750	1,048	1,490	1,974	795	1,563
57.2	64.5	52.4	2,496	6,206	1,666	2,926	1,652	1,773	1,128	920	3,539
62.2	64.0	78.7	7,875	10,000	4,802	6,720	4,386	5,576	3,185	3,145	4,206
68.0	48.8	43.0	966	6,649	1,934	6,421	1,296	1,613	1,315	2,435	1,003
54.6	60.3	72.6	3,112	0	3,546	5,965	741	2,267	3,021	1,428	1,307
55.0	86.7	80.2	3,054	2,019	3,351	6,106	745	1,080	1,441	1,440	1,130

*continued on next page*

**Table 4 — cont'd**

No.	Sector	Degree of Forward Integration (DVX Share in Gross Exports)					
		BRN	CAM	IDN	LAO	MYS	PHP
21	Retail trade, except for motor vehicles and motorcycles; repair of household goods	81.9	70.5	92.0	87.1	81.3	94.0
22	Hotels and restaurants	46.7	76.4	88.4	100.0	76.7	86.1
23	Inland transport	60.6	66.0	84.2	76.1	71.3	73.4
24	Water transport	62.9	0.0	81.8	36.5	72.9	74.9
25	Air transport	13.6	0.0	80.1	29.0	66.5	60.3
26	Other supporting and auxiliary transport activities; activities of travel agencies	42.6	0.0	92.8	36.6	75.8	84.5
27	Post and telecommunications	72.6	76.8	92.2	90.7	82.1	87.0
28	Financial intermediation	83.9	94.1	94.7	91.2	82.7	95.5
29	Real estate activities	85.7	86.0	97.2	133.3	87.5	95.6
30	Renting of machinery and equipment, and other business activities	58.0	77.6	88.6	44.4	71.2	93.7
31	Public administration and defence; compulsory social security	71.2	72.0	94.2	89.9	82.1	95.7
32	Education	66.2	85.5	90.3	93.1	88.2	94.5
33	Health and social work	63.5	77.7	87.2	0.0	80.9	89.9
34	Other community, social, and personal services	82.1	80.5	95.1	0.0	86.5	85.3
35	Private households with employed persons	0.0	0.0	0.0	0.0	0.0	0.0
	<b>Memo: number of sectors</b>						
	High-risk sectors	1	4	31	22	7	26
	Medium-risk sectors	12	13	3	5	22	6
	Low-risk sectors	22	18	1	8	6	3

*Note:* The table shows the score for risk intensity associated with buyer market concentration as of 2021. Colours refer to the level of risks associated with foreign buyer market concentrations: ■ = high risk (score of 50–100); ■ = medium risk (score of 25–50); ■ = low risk (score below 25).

*Source:* Authors' calculation based on ADB's MRIO.

			Degree of Buyer Concentration (HHI)								
SGP	THA	VNM	BRN	CAM	IDN	LAO	MYS	PHP	SGP	THA	VNM
79.3	82.9	0.0	3,029	2,086	3,500	5,987	746	1,107	1,064	1,438	0
74.1	83.6	64.3	4,330	1,145	1,247	3,333	1,896	1,296	1,605	1,332	1,337
77.7	74.1	49.7	1,254	1,541	1,641	1,125	893	1,258	940	2,313	2,287
20.2	53.1	49.3	2,141	0	2,208	4,578	1,917	1,929	1,386	2,706	1,568
47.2	48.3	42.7	2,872	0	935	2,258	1,288	1,517	1,498	2,259	1,238
66.5	77.4	82.5	2,035	0	1,978	1,151	1,169	1,200	919	2,454	1,559
58.6	83.8	55.9	1,491	856	1,112	856	629	964	888	832	1,117
68.1	92.6	82.6	4,537	7,877	1,815	3,782	854	1,801	1,296	1,525	1,618
87.6	88.7	80.0	1,862	1,004	1,202	3,750	1,118	1,091	1,448	811	1,209
55.2	80.8	76.7	1,737	1,108	1,289	1,875	1,866	1,212	972	935	1,227
73.0	84.9	74.1	991	4,251	3,399	4,842	1,743	3,886	725	3,476	801
88.8	83.6	83.3	1,483	3,800	3,542	4,223	1,090	917	2,681	3,539	2,517
81.9	80.2	58.3	2,378	3,819	4,697	0	1,075	1,184	1,691	3,719	2,466
77.3	87.3	73.0	4,376	9,890	2,423	0	1,765	1,859	1,346	897	1,170
0.0	0.0	0.0	0	0	0	0	0	0	0	0	0
3	6	2	17	18	11	24	2	7	4	6	5
13	20	8	10	6	8	3	10	11	6	9	12
19	9	25	8	11	16	8	23	17	25	20	18



transport; air transport; supporting and auxiliary transport activities; post and telecommunications; financial intermediation; real estate activities; renting of machinery and equipment), and other community, social, and personal services.

## Laos

The high-risk sectors associated with both forward integration and buyer concentration are in the low-technology manufacturing sector (e.g., food, beverages, and tobacco; wood and products of wood and cork; pulp, paper, paper products, printing, and publishing; recycling; electricity, gas, and water supply), medium- to high-technology manufacturing sector (e.g., chemicals and chemical products; non-metallic minerals; basic metals and fabricated metal; machinery), business services sector (e.g., sale, maintenance, and repair of motor vehicles and motorcycles; wholesale trade; retail trade; hotels and restaurants; real estate activities), personal and public services sector (e.g., public administration and defence; education), and agriculture, hunting, forestry, and fishing.

The number of high-risk sectors increases from 17 to 22 for the forward integration and 24 for the buyer concentration. The additional high-risk sectors associated with the forward integration include two low-technology manufacturing sectors (e.g., textiles and textile products; leather, leather products, and footwear), two business services sectors (e.g., inland transport; post and telecommunications, and one medium- to high-technology manufacturing sector (e.g., electrical and optical equipment). The additional high-risk sectors associated with the buyer concentration include two low-technology manufacturing sectors (e.g., rubber and plastics; construction), two medium- to high-technology manufacturing sectors (e.g., coke, refined petroleum, and nuclear fuel; transport equipment), two business services sectors (e.g., water transport; financial intermediation), and mining and quarrying.

## Malaysia

Malaysia has seven high-risk sectors associated with forward integration. These include two low-technology manufacturing sectors (e.g., textiles and textile products; rubber and plastics), one medium- to high-

technology manufacturing sector (e.g., coke, refined petroleum, and nuclear fuel), two business services sectors (e.g., water transport; air transport), one primary sector (e.g., mining and quarrying), and one personal and public services sector (e.g., community, social, and personal services). In addition, there are two high-risk sectors associated with the buyer concentration, including non-metallic minerals and electricity, gas, and water supply.

### The Philippines

The high-risk sectors associated with both forward integration and buyer concentration are in the low-technology manufacturing sector (e.g., textiles and textile products; leather, leather products, and footwear; wood and products of wood and cork; electricity, gas, and water supply), primary sector (e.g., mining and quarrying), and personal and public services sector (e.g., public administration and defence).

The number of high-risk sectors increases from 6 to 26 for the forward integration and 7 for the buyer concentration. The additional high-risk sectors associated with the forward integration include three low-technology manufacturing sectors (e.g., food, beverages, and tobacco; recycling; construction), three medium- to high-technology manufacturing sectors (e.g., chemicals and chemical products; machinery; transport equipment), 11 business services sectors (e.g., sale, maintenance, and repair of motor vehicles and motorcycles; wholesale trade; retail trade; hotels and restaurants; water transport; air transport; supporting and auxiliary transport activities; post and telecommunications; financial intermediation; real estate activities; renting of machinery and equipment), one primary sector (e.g., agriculture, hunting, forestry, and fishing), and two personal and public services sectors (e.g., education; health and social work). The additional high-risk sector associated with the buyer concentration is the coke, refined petroleum, and nuclear fuel sector.

### Singapore

Singapore has three high-risk sectors associated with forward integration. These include construction; inland transport; and health and social

work. In addition, there are four high-risk sectors associated with the buyer concentration, including wood and products of wood and cork; electricity, gas, and water supply; sale, maintenance, and repair of motor vehicles and motorcycles; and education.

### Thailand

In Thailand, there are six high-risk sectors associated with forward integration and other six high-risk sectors associated with buyer concentration. The high-risk sectors associated with the forward integration include three low-technology manufacturing sectors (e.g., leather, leather products, and footwear; pulp, paper, paper products, printing, and publishing; rubber and plastics), one medium- to high-technology manufacturing sector (e.g., electrical and optical equipment), one business services sector (e.g., renting of machinery and equipment), and one personal and public services sector (e.g., community, social, and personal services).

The high-risk sectors associated with the buyer concentration include two low-technology manufacturing sectors (e.g., wood and products of wood and cork; electricity, gas, and water supply), one business services sector (e.g., water transport), and three personal and public services sectors (e.g., public administration and defence; education; health and social work).

### Vietnam

Vietnam has only one high-risk sector associated with both forward integration and buyer concentration, which is the electricity, gas, and water supply sector. However, the number of high-risk sectors increases from 1 to 2 for the forward integration and 5 for the buyer concentration. The additional high-risk sector associated with the forward integration is the sector of supporting and auxiliary transport activities. The additional high-risk sectors associated with the buyer concentration include three low-technology manufacturing sectors (e.g., textiles and textile products; leather, leather products, and footwear; recycling) and one personal and public services sector (e.g., education).

## **3.2 Vulnerability of ASEAN GVCs to Key Trading Partners**

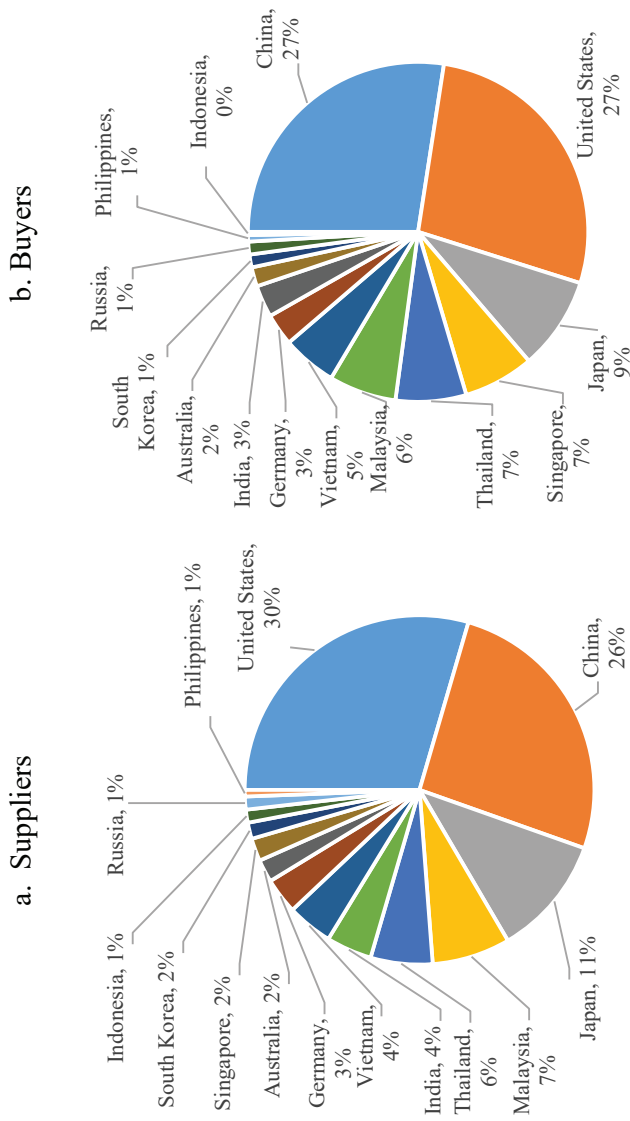
The US, China, and Japan are the top-3 players in ASEAN's upstream and downstream GVCs (Figure 5). They account for 67 per cent of 332 key sectors (sectors that have a market share of at least 15 per cent) in the upstream GVCs, and 64 per cent of 328 key sectors in the downstream GVCs. The US is listed as the top-ranked supplier (30 per cent of 332 key sectors), followed by China (26 per cent) and Japan (11 per cent). Both China and US are listed as the top-ranked buyer (27 per cent of 328 key sectors), followed by Japan (9 per cent). This implies that the US imposition of tariffs on Chinese goods has a limited direct impact on ASEAN GVCs. However, if the US-China trade tension escalates in a way that restricts the use of intermediate inputs from the US or China to manufacture goods in ASEAN, it would cause substantial disruption to ASEAN GVCs.

Other key players on the list of top-10 suppliers and buyers in ASEAN GVCs include four ASEAN countries, namely Malaysia, Thailand, Singapore, and Vietnam, as well as Australia, India, and Germany. Indonesia, the Philippines, Russia, and South Korea play a relatively limited role as suppliers and buyers in ASEAN GVCs.

The limited trade linkage between ASEAN and Russia (and Ukraine) implies that Russia's invasion of Ukraine has a limited direct effect on ASEAN GVCs. However, supply chain disruptions caused by the war in Ukraine and sanctions on Russia have resulted in high global energy and food prices, which raise transportation costs and increase prices of products for ASEAN consumers. Russia and Ukraine are major global exporters of key commodities. In 2021, Russia was the largest producer of natural gas, the second-largest exporter of crude oil and condensates, and the third-largest exporter of coal in the world. Ukraine and Russia are also key global exporters of sunflower oil and wheat. Cost-push inflation driven by higher energy and food prices is further exacerbated by demand-pull inflation driven by economic reopening in ASEAN economies.

An analysis of ASEAN GVCs' vulnerability to partner countries reveals that there is room for ASEAN countries to deepen their intra- and

**Figure 5: Distribution of ASEAN's Suppliers and Buyers by Key Sector, 2021**



Source: Authors' calculation using data from ADB's MRIO.

extra-integration. The intraregional trade integration could be deepened by connecting key suppliers in Malaysia, Thailand, and Vietnam with producers in the remaining ASEAN countries, and connecting key buyers in Malaysia, Singapore, and Thailand to producers in the remaining ASEAN countries. Suppliers and buyers in these countries still have limited market shares in more than 70 per cent of sectors in ASEAN countries (Figures 6 and 7). Prospective sectors for intraregional trade integration range from low- to medium-technology manufacturing sectors to business services sectors.

The extraregional trade integration could be enhanced by linking key suppliers and buyers in China, the US, and Japan to producers in ASEAN countries. Except for the medium- to high-technology manufacturing sectors, suppliers and buyers in China, the US, and Japan have limited market shares in more than 50 per cent of sectors in ASEAN. This implies that ASEAN countries still have the productive capacity to accept the relocation of production plants from China and other countries.<sup>4</sup>

## **4. CONCLUSION AND POLICY RECOMMENDATIONS**

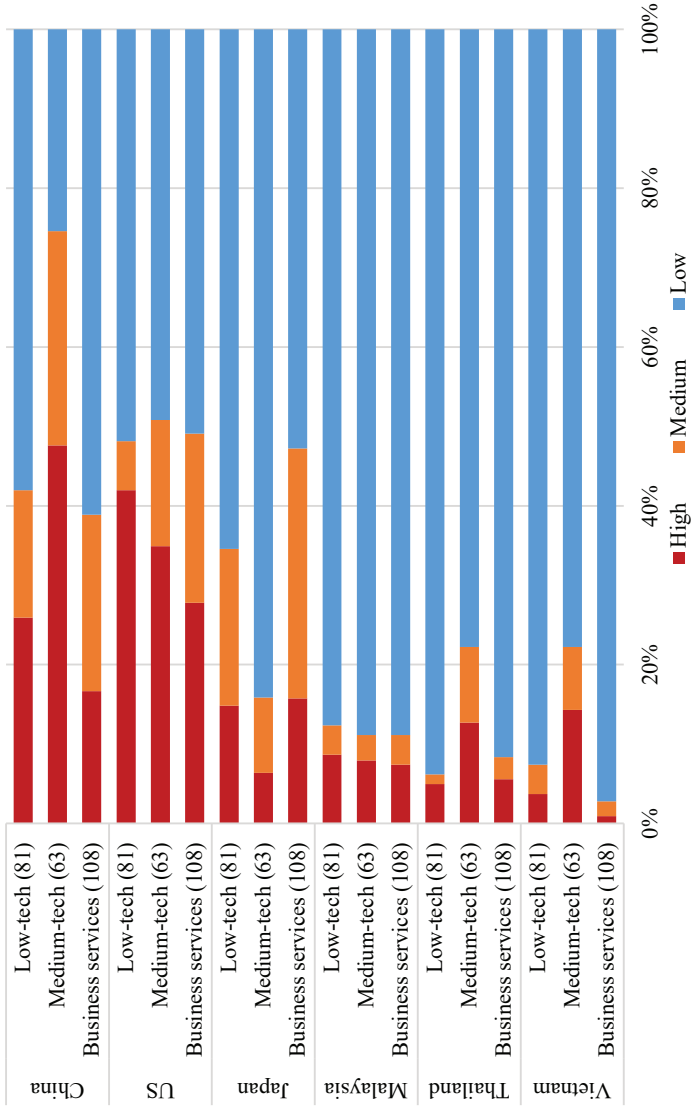
### **4.1 Risk Levels**

Using value-added trade data from the ADB's MRIO, this study shows that ASEAN countries are increasingly participating in GVCs and gaining domestic value-added, although four ASEAN countries—Brunei, Cambodia, Laos and the Philippines—are starting from a very low base. In addition, ASEAN is increasingly becoming an attractive destination for foreign investors, especially those from the US and China. The relocation of firms' production plants to ASEAN is largely motivated by the need to mitigate risks stemming from the US-China trade tension during 2017–2019 and to diversify production plants away from China to strengthen supply chain resilience post-pandemic.

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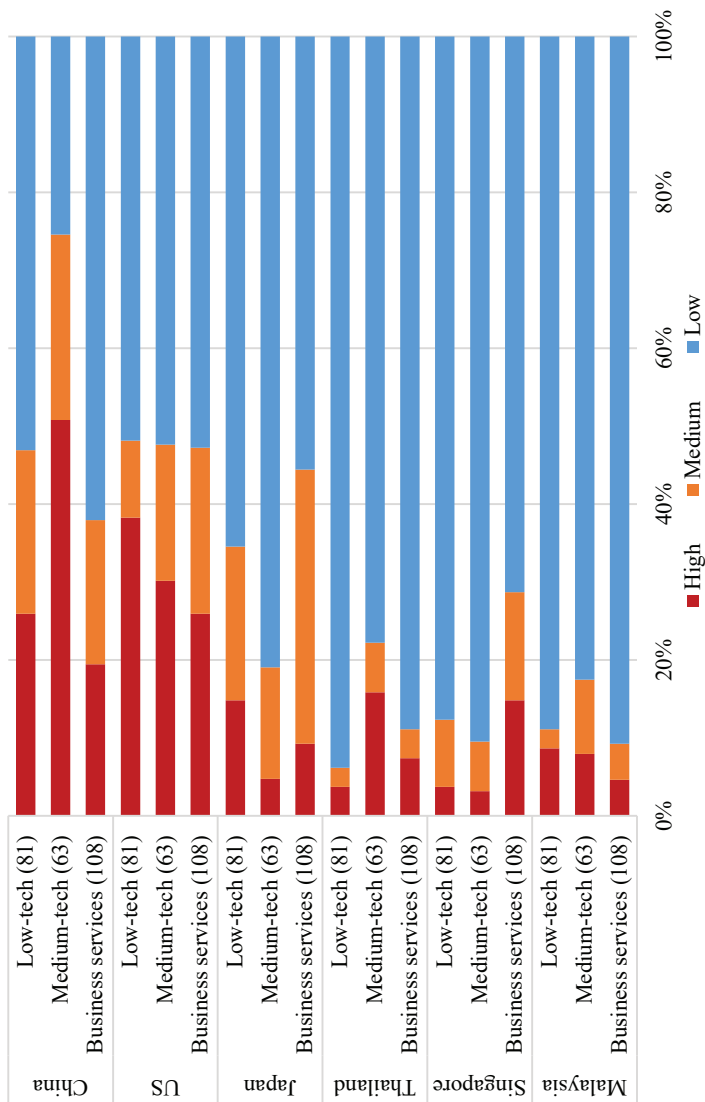
<sup>4</sup> Details of risk assessments across sectors and partner countries are available on request.

**Figure 6: Vulnerability of ASEAN's Upstream GVCs to Partner Countries, 2021**



Source: Authors' calculation using data from ADB's MRIO.

**Figure 7: Vulnerability of ASEAN's Downstream GVCs to Partner Countries, 2021**



Source: Authors' calculation using data from ADB's MRIO.



The risk assessment of ASEAN GVCs reveals that ASEAN countries face different levels of risks associated with the supplier and buyer market concentrations in GVCs. This reflects different degrees of GVC participation across ASEAN countries and sectors. Cambodia, Laos, Brunei, Indonesia, the Philippines and Thailand face significant risks of both supplier and buyer market concentrations. The remaining ASEAN countries, namely Malaysia, Singapore and Vietnam, face the risk of either supplier market concentration or buyer market concentration. The high-risk sectors are concentrated in agriculture, mining, textiles, food, wood products, chemical products, basic metals, electrical and optical equipment, wholesale and retail trade, transports, and financial intermediation.

The risk assessment of ASEAN GVCs also reveals that the upstream and downstream GVCs in ASEAN countries are highly vulnerable to external shocks from three trading partners, namely the US, China, and Japan. These trading partners account for 67 per cent of 332 key sectors in the upstream GVCs, and 64 per cent of 328 key sectors in the downstream GVCs. Any restriction on the use of intermediate inputs from the US or China to manufacture goods in ASEAN can cause substantial disruption to ASEAN GVCs. Other key players on the list of top-10 suppliers and buyers in ASEAN GVCs include four ASEAN countries, namely Malaysia, Thailand, Singapore and Vietnam, as well as Australia, India and Germany. Indonesia, the Philippines, Russia and South Korea play a relatively limited role as suppliers and buyers in ASEAN GVCs.

## **4.2 Trade Policy Measures to Strengthen GVC Resilience in ASEAN**

The key finding in this study is that some industries in ASEAN have already reached a degree of concentration in the supplier market, buyer market, or both. This has raised concerns over the healthy operation of these sectors in GVCs (see Tables 2 to 4). Meanwhile, ASEAN countries also need to balance the risks of GVC concentration with opportunities offered by the relocation of production from China and other countries.

The following set of policy recommendations aims to strengthen GVC resilience from an international trade perspective. These include:

(1) improving the efficiency of releasing goods at border checkpoints through the implementation of ASEAN's authorized economic operators (AEOs) and facilitation of trade in perishable goods; (2) accelerating the implementation of cross-border paperless trade through the ASEAN Single Window (ASW); (3) promoting the utilization of the rules of origin and streamlining non-tariff measures (NTMs) under the Regional Comprehensive Economic Partnership (RCEP); and (4) digitalizing ASEAN GVCs. These trade policy measures should serve as a stepping stone for ASEAN to respond quickly to potential trade disruptions caused by the pandemic or geopolitical shocks.

#### *4.2.1 Traditional Trade Facilitation*

ASEAN countries should accelerate the implementation of the World Trade Organization's (WTO) Trade Facilitation Agreement (TFA) with a particular focus on AEOs and the trade facilitation of perishable goods. These two measures are essential to speed up the process of clearing goods at the border checkpoints during and post-COVID-19 pandemic.

#### Establishing ASEAN's Authorized Economic Operators

ASEAN countries should provide additional trade facilitation measures to trusted traders and providers of logistics services under Article 7.7 of the WTO's TFA. This article requires WTO members, including all ASEAN countries, to provide additional trade facilitation measures related to import, export or transit formalities and procedures to operators who qualify as AEOs according to specified criteria. Potential AEOs include traders and logistics services providers such as customs agents, truck operators and freight forwarders.

If Article 7.7 is fully implemented, there will be fewer physical inspections, faster release times and reduced documentation and data requirements for AEO companies operating across ASEAN. Although data on clearance times for AEO companies in ASEAN are not available, the implementation of the AEO programme in Brazil<sup>5</sup> shows that the

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<sup>5</sup> <https://www.tradefacilitation.org/project/helping-to-establish-an-aeo-regional-recognition-arrangement-2/>

average export and import clearance times for AEO companies are 65 per cent and 81 per cent faster respectively than for non-AEO companies. Customs and other border authorities could better allocate their resources to riskier shipment inspections and more complex procedures due to enhanced supply chain security. The recognition of AEOs as secure and safe business partners should also improve the relationship between them and border authorities.

However, ASEAN countries are at different stages in implementing Article 7.7. The implementation commitments<sup>6</sup> notified to the WTO reveal that Indonesia, Malaysia, the Philippines, Singapore and Thailand have been implementing the AEO scheme's obligations since February 2017. Brunei and Vietnam will be ready to do so in February 2022 and January 2024, respectively. Cambodia, Laos and Myanmar plan to implement Article 7.7 after a transition period but are yet to determine definitive dates of implementation.

The use of the AEO criteria should ensure a mutual recognition arrangement (MRA) of the WTO's AEO scheme at bilateral and regional levels in ASEAN. MRAs may be established among ASEAN's developing economies and then expanded to the rest of ASEAN countries. Greater coverage of MRAs will improve trade efficiency through reduced time and costs associated with cross-border customs controls. This will complement efforts to expand the ASW and streamline NTMs in the region and further boost ASEAN's internal and external trade by making it simpler, faster and more cost-effective for AEO companies.

### Facilitating Trade in Perishable Goods

The COVID-19 outbreak during 2020–21 highlights the need for ASEAN countries to enhance trade facilitation for perishable goods to minimize disruption of trade in essential goods such as food, agricultural and medical products. In November 2020, the ASEAN Secretariat published the ASEAN Comprehensive Recovery Framework (ACRF) and its implementation plan, which set out broad strategies and identified

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<sup>6</sup> <https://tfadatabase.org/implementation/progress-by-measure>

measures for recovery in line with sectoral and regional priorities. The ACRF is regarded as a consolidated regional exit strategy from the COVID-19 crisis.

The trade facilitation measures in the ACRF implementation plan focus on behind-the-border measures rather than at-the-border ones. These behind-the-border measures, including the harmonization of standards for essential goods and the expansion of the ASEAN Single Window to ASEAN dialogue partners, aim to reduce regulatory compliance costs and procedural obstacles for traders.

However, when goods arrive at the customs border checkpoints, traders and transport operators face delays due to physical inspections and complex regulatory requirements set up by different border agencies. These agencies include customs, plant and animal quarantine, and health. ASEAN member states can address these problems by ensuring the expedited release of perishable goods at border checkpoints under the WTO's TFA that focuses on at-the-border measures.

An analysis of the 2019 data on trading across borders from the World Bank's doing business database reveals why this latter focus is needed. The efficiency of administering trade-related procedures at border checkpoints varies significantly across ASEAN. The average number of hours for importers to comply with all border requirements ranges from 8 hours in Cambodia to 33 hours in Singapore, 56 hours in Vietnam, 120 hours in the Philippines, and 230 hours in Myanmar. The average number of hours for exporters to comply with all border requirements ranges from 9 hours in Laos to 10 hours in Singapore, 55 hours in Vietnam, 117 hours in Brunei, and 142 hours in Myanmar. These figures include time for customs clearance and inspection procedures conducted by other border agencies.

Although data on time taken for border compliance for perishable goods such as agricultural and pharmaceutical products alone are not available, perishable goods tend to face longer delays at the border than non-perishable goods. They are more likely to be physically inspected by border authorities to ensure they meet food safety and product quality requirements. When the border authorities do not prioritize the physical inspection and release of perishable goods, exporters and importers incur higher costs of storage and damage of such goods during storage

at border checkpoints. This issue is more pronounced in countries with less efficient trade-related procedures and lacking appropriate storage facilities in normal times. COVID-19 containment measures such as mandatory testing and 14-day quarantine periods for truck drivers added to these delays and their associated costs.

Article 7.9 of the WTO's TFA requires WTO members, which includes all ASEAN countries, to allow the release of perishable goods, provided all the regulatory requirements have been met, within the shortest possible time. This means granting perishable goods appropriate priority when scheduling examinations and allowing for proper storage prior to release, including release at storage facilities where practicable.

If Article 7.9 is fully implemented, it should result in the faster release of perishable goods. This should prevent or reduce unnecessary delays at the border, decrease the risk of damages, prevent business losses and increase the business competitiveness of traders and transport operators. Adequate storage facilities would also reduce product quality deterioration due to border clearance delays. Fewer, shorter delays should help traders and transport operators preserve the quality of their products and improve relations with buyers.

ASEAN countries, as suggested by the wide variance in average border clearance times, are in different stages in the implementation of Article 7.9 of the WTO's TFA. The implementation commitments notified to the WTO reveal that 6 ASEAN member states have been implementing the obligations for the quick release of perishable goods under Article 7.9 since February 2017. They are Brunei, Indonesia, Malaysia, the Philippines, Singapore and Thailand. The remaining four—Cambodia, Laos, Myanmar and Vietnam (CLMV)—plan to implement Article 7.9 after a transition period. Laos began to implement it in January 2021, Vietnam in January 2023, and Cambodia in January 2026. Myanmar has yet to determine the date of implementation.

ASEAN countries, especially the poorer CLMV, should reinforce their ongoing efforts in facilitating trade in perishable goods at the border while implementing the ACRF's behind-the-border measures. Otherwise, long delays in the release of perishable goods at the border aggravated by the COVID-19 crisis, and future pandemic could increase time and costs

for traders and transport operators, which are passed on to importers and consumers as higher prices and lower quality products.

#### *4.2.2 Digital Trade Facilitation*

Accelerating the implementation of cross-border paperless trade measures between ASEAN and its key trading partners such as China, India, Japan, South Korea, and the US reduces the time and costs of conducting international trade transactions while enabling electronic processing of trade documents during the pandemic (Suvannaphakdy and Neo 2022). Work-from-home directives stemming from COVID-19 control measures mean that some regulatory authorities in the ministries of trade, health or agriculture have to provide public services from different locations. Such services might not be fully available to process paper documents submitted by traders. This increases the risks of disrupting supply chains in food and medical supplies, which have become even more essential.

If cross-border paperless trade using the ASEAN Single Window (ASW) is fully implemented, it should make intraregional trade simpler, cheaper and more resilient. This would help to boost the region's competitiveness. At the 53rd ASEAN Economic Ministers' Meeting on 8–9 September 2021, regional leaders highlighted the need to accelerate digital economic integration.

The full implementation of the ASW will help mitigate supply chain disruptions caused by the pandemic. For example, a survey by the Business Continuity Institute reveals that 39 per cent of firms in 2020 experienced delays in cross-border land transportation due to lockdowns as well as testing and quarantines of truck drivers. The ASW enables traders and other economic operators—transporters, logistics firms, freight forwarders and customs brokers—to submit all trade-related documents electronically, and only once, for each occurrence of their exports or imports. Such documents are then processed electronically by the regulatory authorities either at the office or at home.

The ASW should also reduce time and cost for both the public and private sectors. Trade information submitted to the ASW via the national single windows (NSWs) of participating countries can be exchanged or made accessible to all relevant government authorities for processing.

This eliminates the need for the business to make multiple submissions of the same information or documents. The authorities' responses can be returned to the applicant via the same single-entry point. In the absence of ASW, a business must approach each border authority separately—often physically at different offices or locations—and provide the information or documents required using the relevant forms, procedures and systems.

The ASW is a stepping-stone to more efficient regional supply chains. According to the ASEAN Secretariat, all ASEAN countries have joined the ASW's live operation, which in 2020 allowed more than 800,000 electronic exchanges of certificates of origin for granting preferential tariff treatment among member countries under the ASEAN Trade in Goods Agreement. ASEAN is also seeking to expand the types of trade-related information exchanged. Five ASEAN countries, namely Cambodia, Myanmar, Singapore, Malaysia and Thailand, have exchanged customs declaration documents through the ASW. The other five ASEAN countries are expected to join this year.

While the ASW is an ideal platform for regional paperless trade, challenges remain. The UN Global Survey on Digital and Sustainable Trade Facilitation in 2021 reveals that ASEAN has not reaped the potential benefits of cross-border paperless trade. The grouping's member countries are in different stages of implementing their NSWs and cross-border paperless trade measures. First, while the NSWs in ASEAN countries have been established, half of them have not yet been fully implemented. Laos is in the planning stage, while Cambodia, Myanmar, the Philippines and Vietnam have only partially implemented their NSWs. In contrast, Brunei, Indonesia, Malaysia, Singapore and Thailand have fully implemented their NSWs. Linking the NSWs of countries at different levels of development remains a key challenge for achieving a full-fledged ASW. This requires shared procedures between participating countries.

Second, less than half of ASEAN countries have instituted laws and regulations for cross-border electronic transactions, and established recognized certification authorities to issue digital certificates for electronic transactions. The two measures have been fully implemented

in Malaysia, Singapore and Thailand. Cambodia has fully implemented the laws and regulations for electronic transactions, but has not yet established recognized certification authorities. The remaining six ASEAN countries, namely Brunei, Indonesia, Laos, Myanmar, the Philippines and Vietnam, have either partially implemented or are in the planning stages of implementing these measures.

Third, the cross-border electronic exchange of trade-related documents among ASEAN countries has not yet been fully implemented. All ASEAN countries have partially exchanged electronic certificates of origin. Indonesia, Malaysia, Myanmar, the Philippines, Singapore, and Vietnam have partially exchanged sanitary and phytosanitary (SPS) certificates that certify a consignment of goods such as agricultural products as being free from harmful pests and plant diseases. The other ASEAN countries have either not started the exchanges, or remain in the planning stage of starting the process. In addition, Cambodia, Myanmar, Singapore, and Thailand have partially exchanged electronic customs declaration documents that provide details of imported or exported goods such as quantity and origin of goods for customs purposes. Other ASEAN countries are in the pilot or planning stage of implementation.

To achieve seamless cross-border paperless trade measures, ASEAN needs to advance its implementation of the ASW. Even strong performers such as Malaysia and Singapore have areas for improvement such as electronic exchanges of SPS certificates and customs declaration documents. Weaker performers such as Cambodia and Laos need to make significant progress to catch up with the rest of the region. ASEAN countries should focus on improving laws and regulations for cross-border electronic transactions, and explore possibilities for improving the efficiency of cross-border electronic exchange of certificates of origin, SPS certificates, and customs declaration documents.

Meanwhile, ASEAN should expand its ASW to its key trading partners such as China, India, Japan, South Korea and the US. These trading partners have operated their national single windows and are ready to connect them with the ASW. They have also put in place the legal framework for electronic transactions, and to some extent engaged in the cross-border electronic exchange of trade-related documents and



data. The sequence of ASW expansion may begin with countries that have FTAs with ASEAN, and then engage with the remaining trading partners. This will put ASEAN on the right path to bolstering its GVCs during and after the pandemic.

#### *4.2.3 Tariff and Non-tariff Measures*

ASEAN governments should raise firms' awareness and utilization of RCEP to support firms' diversification of their foreign suppliers and buyers. The RCEP, which came into force on 1 January 2022, consists of ten ASEAN countries and five FTA partners of ASEAN (Australia, China, Japan, New Zealand and South Korea). Its economic impacts on GVCs can be summarized into two aspects.

First, the RCEP reduces import tariffs and consolidates rules of origin in ASEAN+1 free trade agreements (e.g., ASEAN-China FTA, ASEAN-Japan FTA). It eliminates as much as 90 per cent of tariffs on goods traded between its signatories over the next 20 years from the date of its entry into force (Chapter 2). In 2022, China—one of the top three export markets of ASEAN countries—would eliminate about 70 per cent of its tariffs on products imported from ASEAN, while ASEAN developing countries such as Brunei, Singapore, Thailand and Vietnam—who have ratified the agreement—would eliminate about 75 per cent of their tariffs on imported products from China. The remaining tariffs would be gradually eliminated over 20 years.

To increase firms' utilization of preferential tariffs, the RCEP consolidates different rules of origin in ASEAN+1 FTAs and sets regional content rules (Chapter 3). Many products require at least 40 per cent of their value to be added within RCEP partners to take advantage of preferential tariffs. This is particularly important for the development of high-tech value chains such as electronics and automobiles, where parts and components are manufactured in different countries in the region. Therefore, the relatively high tariff liberalization coupled with harmonized rules of origin in RCEP should not only save costs and increase profits for traders, but also facilitate ASEAN firms' participation in the regional and global value chains.

Second, the RCEP should enhance the harmonization of NTMs such as product standards for food safety, packaging and labelling requirements by promoting transparency, adoption of international standards and mutual recognition of conformity assessment procedures of RCEP partners (Chapter 5 and Chapter 6). Despite progress in tariff liberalization under the ASEAN Free Trade Area and the ASEAN Trade in Goods Agreement, businesses have long complained about the complexity and compliance costs of NTMs imposed by ASEAN governments and their trading partners.

NTM-related costs for traders and producers include gathering information on regulatory requirements in different markets, adjusting the specification of goods and services to comply with different regulatory requirements of importing countries, and complying with different conformity assessment procedures across importing countries. For instance, requirement compliance of ingredients of a food product standard imposed by an importing country incurs one-time costs of product redesign and implementation of an administrative system. Such compliance costs tend to increase with the different requirements of export markets. Various standards and technical regulations that governments of importing countries impose also result in different market access conditions, which pass into higher consumer prices in importing countries and higher export costs in exporting countries.

The RCEP provisions on transparency and adoption of international standards require regulators of its members to embed international best practices into their domestic rule-making procedures and prevent regulations from creating unnecessary barriers to trade. In addition, mutual recognition of conformity assessment results between two or more RCEP partners helps ensure that traders do not face duplicative requirements or procedures when regulations differ across markets.

However, the benefits of tariff liberalization, harmonized rules of origin, and harmonized NTMs for firms, especially SMEs, are not automatic. These policy changes require firms to invest in adopting production processes to meet product standards in the existing or new export markets and acquire new knowledge on the trade rules of all RCEP partners. At the same time, they also require that ASEAN governments

provide a supportive domestic and international operating environment. In this regard, the commencement of RCEP in 2022 initiates the right time to translate the RCEP provisions on tariffs, rules of origin, and NTMs into national action plans of ASEAN countries. This should pave the way for greater coherence of legal framework for regional trade flows while improving firms' ability to adapt to regional and global value chains.

#### *4.2.4 Digitalization of ASEAN GVCs*

Promoting global digital supply chains in ASEAN in the post-pandemic years requires ASEAN as a group to create a greater coherent regulatory framework on cross-border data flows, to enhance digital connectivity both within and outside the region. Enabling and safeguarding cross-border data flows are essential to enhance digital supply chains, which will allow real-time monitoring and traceability. The World Bank's MNC survey reveals that 58 per cent of global MNCs have turned to digital technologies (e.g., data science applications, automation of tasks and processes, and the internet of things) to optimize production capacity, maintain inventory, and manage logistics.

However, an analysis of 31 regulatory elements on cybersecurity and data protection (see Annex 2 for the analytical framework of data safeguards) using data from the World Bank's Global Data Regulation Diagnostic Survey in 2021 reveals that ASEAN has under-regulated data safeguards. It has moderately developed a regulatory framework for safeguarding cybersecurity and non-personal data. At the same time, ASEAN is still at an early stage in developing a regulatory framework for protecting personal data. Under-regulated cybersecurity increases the risks of cyber threats and reduces foreign investors' confidence in the digitalization of their supply chains (Table 5).

Strengthening cross-border data safeguard measures should be built on the existing regional trade agreements, such as the RCEP and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP). This can reinforce the role of consensus-based standards with commitments to develop and use international standards where available. Such standards should be used to create domestic regulations on data security and cybersecurity requirements for data

**Table 5: Scores of Regulatory Frameworks for Data Safeguards in ASEAN Countries**

Country	Cybersecurity and Cybercrime	Personal Data Protection	Non-personal Data Protection
Cambodia	33	33	0
Indonesia	39	50	100
Laos	50	50	0
Malaysia	44	67	100
Myanmar	28	8	0
Philippines	94	83	100
Singapore	61	67	0
Thailand	39	17	100
Vietnam	89	42	100
<b>ASEAN</b>	<b>53</b>	<b>46</b>	<b>56</b>

*Note:* The table shows the score for good-practice governance by regulatory framework as of 2020. Colours refer to the level of the regulatory framework: ■ = advanced level (score of 75–100); ■ = moderate level (scores of 50–75); ■ = evolving level (scores of 25–50); and ■ = basic level (scores below 25).

*Source:* Authors' calculation based on the World Bank's Global Data Regulation Diagnostic Survey in 2021, <https://microdata.worldbank.org/index.php/catalog/3866> (accessed 21 April 2022).

controllers and processors. Greater coherence of a regulatory framework on data flows across RCEP and CPTPP member countries should reduce the uncertainty, compliance costs, and complexity of data sharing and data safeguard measures, which would facilitate the digital supply chain management within ASEAN, and between ASEAN and its key trade and investment partners.

# ANNEXES

## Annex 1: Methodology for Risk Assessment

*Table A.1.1: Risk Calculation of Supplier Market Concentration*

<b>Degree of Backward Integration</b> (Extent to Which Foreign Materials Are Used in the Production of Exports)		<b>Degree of Concentration</b> (Extent to Which Suppliers of Foreign Materials Are Concentrated)	
<b>FVA Threshold<sup>+</sup></b>	<b>Risk Score (1)</b>	<b>HHI Threshold</b>	<b>Risk Score (2)</b>
High FVA	1	High (HHI = > 2,500)	1
	1	Medium (HHI = 1,500–2,500)	0.5
	1	Low (HHI < 1,500)	0.1
Medium FVA	0.5	High (HHI = > 2,500)	1
	0.5	Medium (HHI = 1,500–2,500)	0.5
	0.5	Low (HHI < 1,500)	0.1
Low FVA	0.1	High (HHI = > 2,500)	1
	0.1	Medium (HHI = 1,500–2,500)	0.5
	0.1	Low (HHI < 1,500)	0.1

*Note:* <sup>+</sup> See the FVA thresholds in Table A.1.3.

*Source:* Authors' construction based on ASEAN-Japan Centre (2020).

<b>Risk to Vulnerability (High: 50–100, Medium: 25–50, Low: &lt;25)</b>		<b>Upstream Value Chain Description</b>
<b>Risk Colour</b>	<b>Risk Intensity (3) = (1)*(2)*100</b>	
	100	Value chains which use a high share of foreign materials in their exports, and such materials are imported from 1–2 countries.
	50	Value chains which use a high share of foreign materials in their exports, and such materials are imported from 3 countries.
	10	Value chains which use a high share of foreign materials in their exports, and such materials are imported from more than 3 countries.
	50	Value chains which use a medium share of foreign materials in their exports, and such materials are imported from 1–2 countries.
	25	Value chains which use a medium share of foreign materials in their exports, and such materials are imported from 3 countries.
	5	Value chains which use a medium share of foreign materials in their exports, and such materials are imported from more than 3 countries.
	10	Value chains which use a low share of foreign materials in their exports, and such materials are imported from 1–2 countries.
	5	Value chains which use a low share of foreign materials in their exports, and such materials are imported from 3 countries.
	1	Value chains which use a low share of foreign materials in their exports, and such materials are imported from more than 3 countries.

**Table A.1.2: Risk Calculation of Buyer Market Concentration**

<b>Degree of Forward Integration</b> (Extent to Which a Country's Exported Inputs Are Integrated into Other Countries' Exports)		<b>Degree of Concentration</b> (Extent to Which Export Markets Are Concentrated)	
<b>DVX Threshold<sup>+</sup></b>	<b>Risk Score (1)</b>	<b>HHI Threshold</b>	<b>Risk Score (2)</b>
High DVX	1	High (HHI = > 2,500)	1
	1	Medium (HHI = 1,500–2,500)	0.5
	1	Low (HHI < 1,500)	0.1
Medium DVX	0.5	High (HHI = > 2,500)	1
	0.5	Medium (HHI = 1,500–2,500)	0.5
	0.5	Low (HHI < 1,500)	0.1
Low DVX	0.1	High (HHI = > 2,500)	1
	0.1	Medium (HHI = 1,500–2,500)	0.5
	0.1	Low (HHI < 1,500)	0.1

*Note:* <sup>+</sup> See the DVX thresholds in Table A.1.3.

*Source:* Authors' construction based on ASEAN-Japan Centre (2020).

Risk to Vulnerability (High: 50–100, Medium: 25–50, Low: <25)		Downstream Value Chain Description
Risk Colour	Risk Intensity (3) = (1)*(2)*100	
	100	Value chains in which a high share of a country's exports is sold in 1–2 foreign markets.
	50	Value chains in which a high share of a country's exports is sold in 3 foreign markets.
	10	Value chains in which a high share of a country's exports is sold in more than 3 foreign markets.
	50	Value chains in which a medium share of a country's exports is sold in 1–2 foreign markets.
	25	Value chains in which a medium share of a country's exports is sold in 3 foreign markets.
	5	Value chains in which a medium share of a country's exports is sold in more than 3 foreign markets.
	10	Value chains in which a low share of a country's exports is sold in 1–2 foreign markets.
	5	Value chains in which a low share of a country's exports is sold in 3 foreign markets.
	1	Value chains in which a low share of a country's exports is sold in more than 3 foreign markets.



**Table A.1.3: Risk Thresholds of Foreign and Domestic Value-Added in Exports for ASEAN, 2021**

No.	Sector	FVA Threshold			DVX Threshold		
		Low	Medium	High	Low	Medium	High
1	Agriculture, hunting, forestry, and fishing	< 6.2	6.2–10.3	⇒ 10.3	< 70.2	70.2–86.5	⇒ 86.5
2	Mining and quarrying	< 4.9	4.9–12.6	⇒ 12.6	< 58.9	58.9–84.2	⇒ 84.2
3	Food, beverages, and tobacco	< 11.1	11.1–37.3	⇒ 37.3	< 59.4	59.4–72.9	⇒ 72.9
4	Textiles and textile products	< 24.3	24.3–41.6	⇒ 41.6	< 50.1	50.1–68.9	⇒ 68.9
5	Leather, leather products, and footwear	< 16.5	16.5–31.3	⇒ 31.3	< 34.9	34.9–61.0	⇒ 61.0
6	Wood and products of wood and cork	< 14.0	14.0–21.1	⇒ 21.1	< 64.6	64.6–79.3	⇒ 79.3
7	Pulp, paper, paper products, printing, and publishing	< 9.6	9.6–25.8	⇒ 25.8	< 54.7	54.7–79.2	⇒ 79.2
8	Coke, refined petroleum, and nuclear fuel	< 10.9	10.9–33.5	⇒ 33.5	< 24.4	24.4–70.0	⇒ 70.0
9	Chemicals and chemical products	< 20.7	20.7–29.1	⇒ 29.1	< 52.9	52.9–63.7	⇒ 63.7
10	Rubber and plastics	< 17.8	17.8–20.9	⇒ 20.9	< 41.8	41.8–65.3	⇒ 65.3
11	Other non-metallic minerals	< 26.0	26.0–37.1	⇒ 37.1	< 40.4	40.4–64.1	⇒ 64.1
12	Basic metals and fabricated metal	< 20.8	20.8–32.0	⇒ 32.0	< 43.7	43.7–50.9	⇒ 50.9
13	Machinery, nec	< 31.3	31.3–40.4	⇒ 40.4	< 32.1	32.1–53.8	⇒ 53.8
14	Electrical and optical equipment	< 29.9	29.9–32.6	⇒ 32.6	< 44.0	44.0–58.2	⇒ 58.2
15	Transport equipment	< 34.8	34.8–40.9	⇒ 40.9	< 47.0	47.0–54.1	⇒ 54.1
16	Manufacturing, nec, recycling	< 26.9	26.9–41.9	⇒ 41.9	< 53.7	53.7–64.5	⇒ 64.5

17	Electricity, gas, and water supply	< 18.5	18.5-25.1	=> 25.1	< 64.0	64.0-76.0	=> 76.0
18	Construction	< 27.1	27.1-34.0	=> 34.0	< 48.8	48.8-64.1	=> 64.1
19	Sale, maintenance, and repair of motor vehicles and motorcycles; retail sale of fuel	< 7.0	7.0-21.0	=> 21.0	< 60.3	60.3-80.8	=> 80.8
20	Wholesale trade and commission trade, except for motor vehicles and motorcycles	< 7.2	7.2-14.6	=> 14.6	< 73.8	73.8-86.7	=> 86.7
21	Retail trade, except of motor vehicles and motorcycles; repair of household goods	< 6.0	6.0-14.5	=> 14.5	< 79.3	79.3-82.9	=> 82.9
22	Hotels and restaurants	< 11.6	11.6-19.8	=> 19.8	< 74.1	74.1-83.6	=> 83.6
23	Inland transport	< 19.0	19.0-21.1	=> 21.1	< 66.0	66.0-74.1	=> 74.1
24	Water transport	< 12.0	12.0-25.7	=> 25.7	< 36.5	36.5-62.9	=> 62.9
25	Air transport	< 24.2	24.2-41.9	=> 41.9	< 29.0	29.0-48.3	=> 48.3
26	Other supporting and auxiliary transport activities; activities of travel agencies	< 9.4	9.4-11.6	=> 11.6	< 42.6	42.6-77.4	=> 77.4
27	Post and telecommunications	< 9.8	9.8-15.6	=> 15.6	< 72.6	72.6-83.8	=> 83.8
28	Financial intermediation	< 3.6	3.6-11.3	=> 11.3	< 82.7	82.7-92.6	=> 92.6
29	Real estate activities	< 2.1	2.1-8.8	=> 8.8	< 86.0	86.0-88.7	=> 88.7
30	Renting of machinery and equipment, and other business activities	< 7.3	7.3-15.8	=> 15.8	< 58.0	58.0-77.6	=> 77.6

*continued on next page*

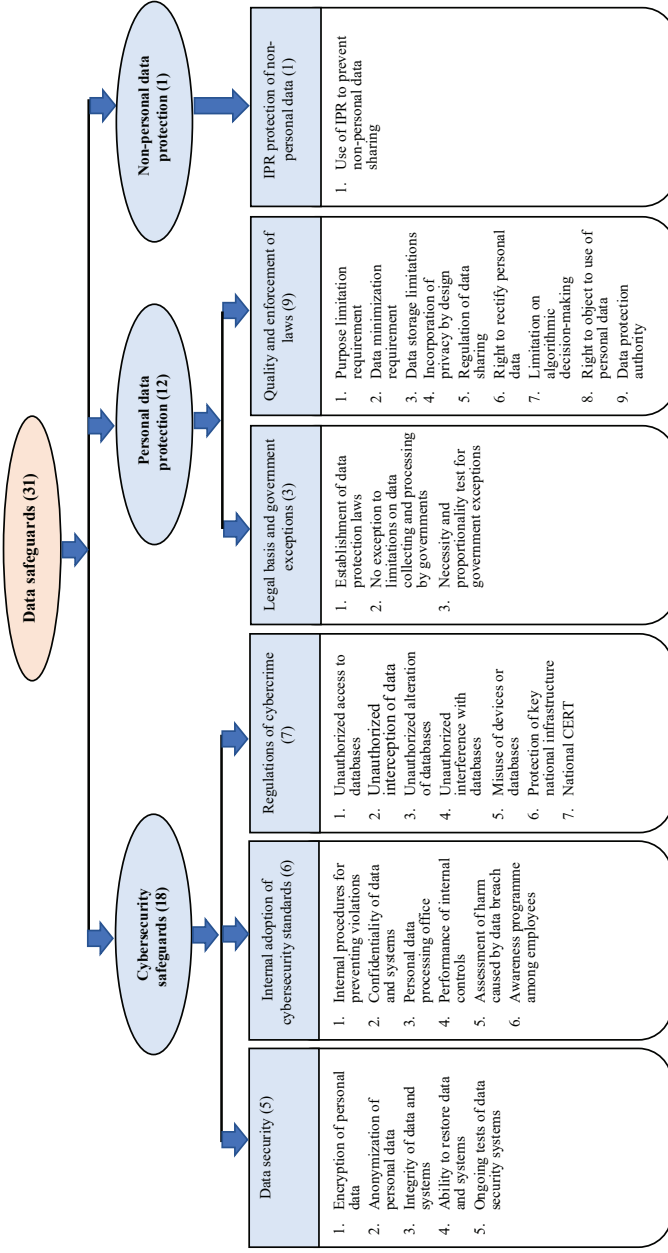
**Table A.1.3 — cont'd**

No.	Sector	FVA Threshold			DVX Threshold		
		Low	Medium	High	Low	Medium	High
31	Public administration and defence; compulsory social security	< 6.3	6.3–15.6	⇒ 15.6	< 73.0	73.0–84.9	⇒ 84.9
32	Education	< 8.3	8.3–13.8	⇒ 13.8	< 83.6	83.6–88.8	⇒ 88.8
33	Health and social work	< 11.1	11.1–18.4	⇒ 18.4	< 63.5	63.5–80.9	⇒ 80.9
34	Other community, social, and personal services	< 9.4	9.4–11.6	⇒ 11.6	< 77.3	77.3–85.3	⇒ 85.3
35	Private households with employed persons	0	—	—	0	—	—

Note: “<” less than; “⇒” equal or greater than.

Source: Authors’ calculation.

## Annex 2: Analytical Framework for Assessing Data Safeguards in ASEAN



Note: Figures in the bracket refers to the number of regulatory elements. CERT stands for cybersecurity infrastructure and enforcement agency.

Source: Authors' construction based on World Bank (2021).

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