

The State of APEC Supply Chains

Lessons learned, key strategies
to strengthen resilience

November 2023





About this report

This report was commissioned by the National Center for the Asia Pacific Economic Cooperation (NCAPEC) and prepared by Access Partnership as part of the APEC Business Advisory Council's (ABAC) broader work on supply chain resilience in 2023. Preliminary insights from this report were presented at the 2nd ABAC meeting in May 2023 and shared at Transport, Trade, Health, MSME and Women Ministerials throughout the year.

This report studies broader supply chain trends across four product segments in the APEC region: (1) consumer goods, (2) consumer technology, (3) food, and (4) healthcare. The insights contained in this report are based on literature research and external engagements by Access Partnership and do not include any commercial information from NCAPEC or its members unless explicitly permitted by respective parties. NCAPEC does not endorse any estimates made in this report. Where information has been obtained from third-party or proprietary sources, this is clearly referenced in the footnotes.

NCAPEC is a US business association dedicated to advancing private sector policy priorities in the Asia Pacific region. Its members consist of approximately 50 US Fortune 500 companies. NCAPEC also collaborates with business associations across APEC for this purpose, including ABAC, which has been a key stakeholder in the preparation of this report.

Access Partnership is a global policy consulting firm with integrated expertise across many areas including technology, government affairs, multilateral organizations, and sustainability. The company's Economics Strategy (ES) Team, a global practice with experienced economists and management consultants, conducted the research for and preparation of this document.

NCAPEC would like to thank Johnson & Johnson and UPS for supporting the development and execution of this study. Their outstanding contributions, alongside many organizations and their representatives interviewed, provide valuable perspectives to enrich the insights presented in this report. Their stories are captured in the Appendix.

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Foreword

The COVID-19 pandemic challenged almost every aspect of trade across APEC. The region saw severe constraints in cargo capacity and debilitating congestion that created long lead times and short supply of raw materials and components. Workforce shortages further challenged supply chains. At the same time, travel restrictions and movement controls cost countless jobs as the region tried to balance saving lives with protecting livelihoods. Every community faced some of these same tradeoffs but the disruptions across APEC affected trade around the globe given the economic importance of the region.

Businesses experienced first-hand the Great Supply Chain Disruption that occurred between 2020 and 2022, the effects of which unfortunately still continue today. Collectively, we learned important lessons from how global supply chains are organized and how government measures can impact efficiency and resilience. That is why the APEC Business Advisory Council (ABAC) embarked this year on efforts to share our stories, identify lessons learned, and provide concrete recommendations for strengthening supply chains across APEC. Throughout 2023, we connected with businesses large and small to share our experiences with APEC's Transportation, Trade, Health, Women and MSME Ministers. Our message has been clear: We must learn from the missteps of the past to be better equipped for future disruptions and create resilience within and across our economies.

This is especially important for healthcare supply chains delivering life-saving and life-extending medicines and technologies to doctors and patients. Healthcare supply chains are deeply verticalized and organized to ensure the highest levels of quality, safety and regulatory compliance. The disruptions experienced in healthcare supply chains remind us that resilience can only be built and strengthened through effective partnership between governments and the private sector. You can find important lessons learned and policy recommendations for this critical sector in a dedicated report on [Healthcare Supply Chains](#).

APEC's businesses have also learned from the experience and taken their own steps to build new resilience into supply chains and operations. We are greatly encouraged that more firms have invested in strengthening visibility across their supply chains post-pandemic; while others are exploring new arrangements to bolster the resilience of their business models and broaden their customer and supplier base. To better understand what supply chain resilience entails, share best practices, and strengthen capacity building among MSMEs, we are pleased to also present the ABAC [Supply Chain Resilience Toolkit](#). This important tool will help businesses bolster resilience, manage risk, and prepare for future disruptions.

UPS and Johnson & Johnson are proud to have collaborated with the National Center for APEC, Access Partnership, and members of the APEC business community to share these insights and recommendations. We are grateful to our partners in the Food, Consumer Goods, Consumer Tech, Healthcare, and Transportation & Logistics sectors, who provided their first-hand experiences to shape our recommendations. Our thanks also to the 1271 firms across 15 APEC economies that participated in the survey to help gauge the resilience of APEC's supply chains.

APEC has always demonstrated strong partnership with businesses and convened diverse sets of stakeholders to drive more meaningful regional responses to systemic problems. Every crisis, like the most recent pandemic, is an opportunity to learn and do things differently to better serve our people and strengthen our communities. We, therefore, call on APEC to once again play a leadership role by establishing a framework for supply chain resilience that can help set the standard for the world. We look forward to working with all stakeholders, both across APEC and within individual economies, to expand upon existing APEC initiatives and advance effective policies that support stronger resilience for the Asia Pacific region.



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Top takeaways

State of APEC Supply Chains

**01**

APEC's supply chains are long, complex, and susceptible to disruptions. This results from firms leveraging comparative advantages across economies to optimize their supply chains, creating greater length and complexity. At the same time, segments like consumer goods, consumer technology, food, and healthcare vary significantly in how their supply chains are designed and operate. This has directly impacted how each sector responded to and recovered from disruptions.

02

Recent disruptions offer lessons for policymakers and businesses. Policy responses made during the pandemic disrupted the flow of materials and personnel, revealing a lack of awareness of how global supply chains are organized, what they are dependent on, and how distribution to communities happen. While some supply chains managed to adjust, failure to coordinate policy responses across economies weakened supply chains built around regional and global networks, making them vulnerable and unable to keep up with escalating demand. First-hand accounts of multinational corporations – the lead firms in supply chains – provides policymakers and other businesses an opportunity to learn and be ready for future crises.

03

Post-pandemic, supply chains in APEC are more resilient – but they show cracks. Across five key dimensions of resilience, firms in APEC have mostly invested in greater supply chain visibility while shoring up their business models after the pandemic. However, the majority remain vulnerable in terms of flexibility and connectivity, as they continue to rely on only one product, a handful of suppliers and customers, and few transport options.

04

Five strategies for APEC to strengthen supply chain: (1) Ensure flow of trade and cross-border movement of essential services and personnel are maintained during disruptions; (2) Establish a platform for regional cooperation and future-readiness; (3) Digitize documentation, processes, and logistics services; (4) Strengthen the region's infrastructure and transportation connectivity; and (5) Develop a framework for capacity building for MSMEs.

05

Five best practices for firms to build greater supply chain resilience: (1) Measure supply chain resilience and identify gaps; (2) Diversify products, customers, and suppliers; (3) Maintain a "portfolio" of transportation options; (4) Create more visibility over supply chains through strategic use of data and digital capabilities; and (5) Align with leading businesses to emulate industry best practices and develop joint advocacy.



1 APEC's complex and interconnected supply chains

What do APEC supply chains look like today and how have recent disruptions shaped them? This chapter provides an overview, based on interviews with lead firms and literature research.

Deepening globalization has resulted in more businesses across APEC engaging in an increasingly complex network of trade. Global supply chains consist of a highly synchronized series of steps from the extraction of raw materials and manufacturing of goods, to the distribution of finished products to the end user. On average, cross-border trade has grown to be equivalent to half of GDP for most economies.¹ Around half of the value of global traded goods originate from economies of the Asia-Pacific Economic Cooperation (APEC), consisting of 21 of the largest economies in the world.² Among APEC members, on average, intra-APEC trade comprises more than 70% of total trade.

Increasing product specialization enabled by international trade has created longer and more complex supply chains, as firms seek to leverage the comparative advantages of different markets.³ Lead firms trading in consumer goods, pharmaceuticals, and medical equipment interviewed for this study revealed how they import raw materials from around the world, while basing production in regions such as Asia to leverage cost savings from large-scale production, or in North America to be close to their consumers. Interviewed firms trading in apparel and electronics source inputs from across the globe and have manufacturing bases located across multiple APEC economies to capitalize on competitive wages and business-friendly environments.

The extension of supply chains has been accompanied by increasing economic reliance. While specialization brings cost efficiencies and greater quality, it has also generated vulnerabilities in supply chains where certain economies or a handful of firms are dominant. For instance, lead firms have cited how overreliance on certain manufacturing bases that are beyond their singular control, or dependence on regions for key commodities such as for resin or cotton, can create rigidity in their production processes and present risks during periods of disruption. Interestingly, the deepening supply chain connections between APEC economies are observed in trade data. APEC members have increased trade with each other relative to global trading partners. Between 2011 and 2021, the share of APEC's total export volumes that went toward other members increased from 68.3% to 70.2%, while the share of imports rose from 60.9% to 64.7% (Exhibit 1).⁴ At the economy level, members dedicated, on average, at least 70% of both exports and imports to other APEC members in 2021.

At the product segment level, high-level trends in trade dependency remain largely consistent, while makeup of supply chains differs significantly. These four key product segments (consumer goods, consumer technology, food, and healthcare) contributed to around 37% of APEC's total import and export volumes in 2021 and formed a significant share of finished goods that consumers demand.⁵ Export destinations and import sources in APEC for these four segments are relatively diverse, hovering between 1,000-2,000 on the HHI.ⁱ Imports of consumer technology goods for the overall segment are somewhat more concentrated, with an HHI score of above 2,800 since 2011. Notable differences are observed in the supply chain models across segments (Exhibit 2), including in input sourcing, manufacturing, and transportation of finished goods – all of which determine how efficiently goods are designed or produced from inception right till distribution to the end user.

i. The HHI helps to measure an economy's level of trade concentration with its partners – the higher the figure, the higher the market concentration. Values represent a sum of squared concentration ratios across all trade partners. The figure ranges from the highest possible figure of 10,000 (i.e., if a single partner that takes up 100% of trade, the HHI would be 100 squared) toward a value of zero (i.e., many trade partners all with very low concentration ratios). Practitioners typically regard a HHI of above 1,500 as a sign of some level of concentration.

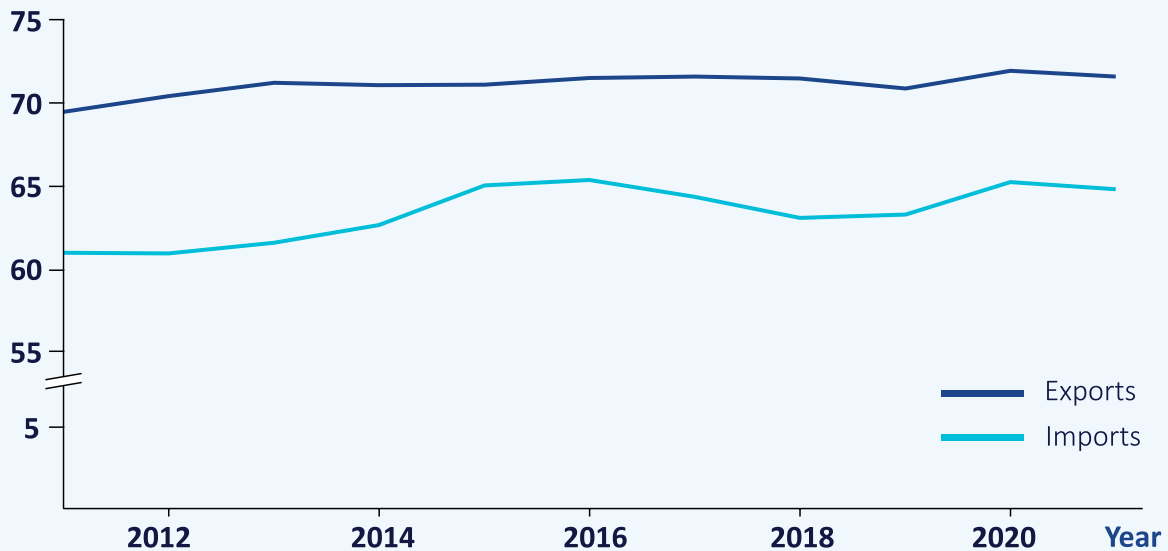
Exhibit 1

Intra-APEC trade has been on the rise in the past decade, with almost all economies conducting significant trade with other members

Intra-APEC trade as a share of APEC's total trade

Percentage of total trade volume for years 2011 and 2021, %

Percent of trade volume

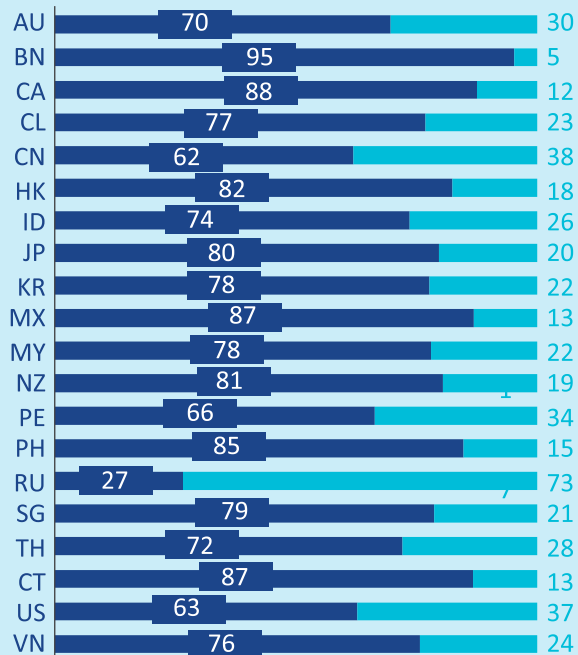


Intra-APEC trade as a share of total trade in 2021 in each economy¹

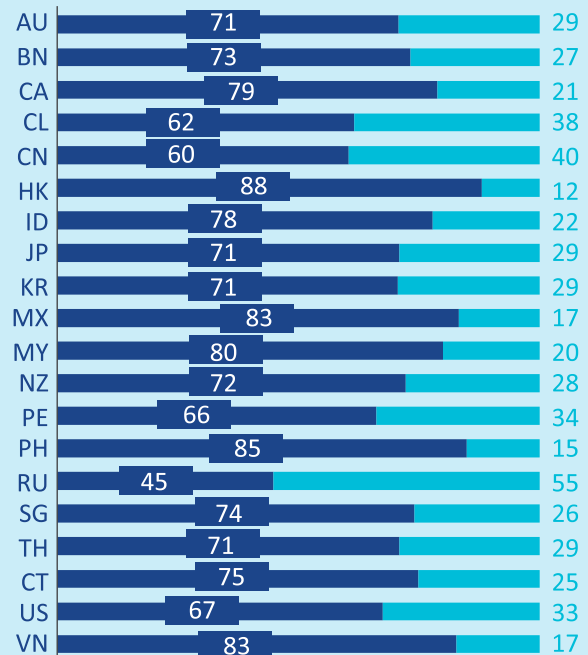
Percentage of total trade volume, %

■ Intra-APEC
■ Rest of the World

Proportion of total exports (%)



Proportion of total imports (%)

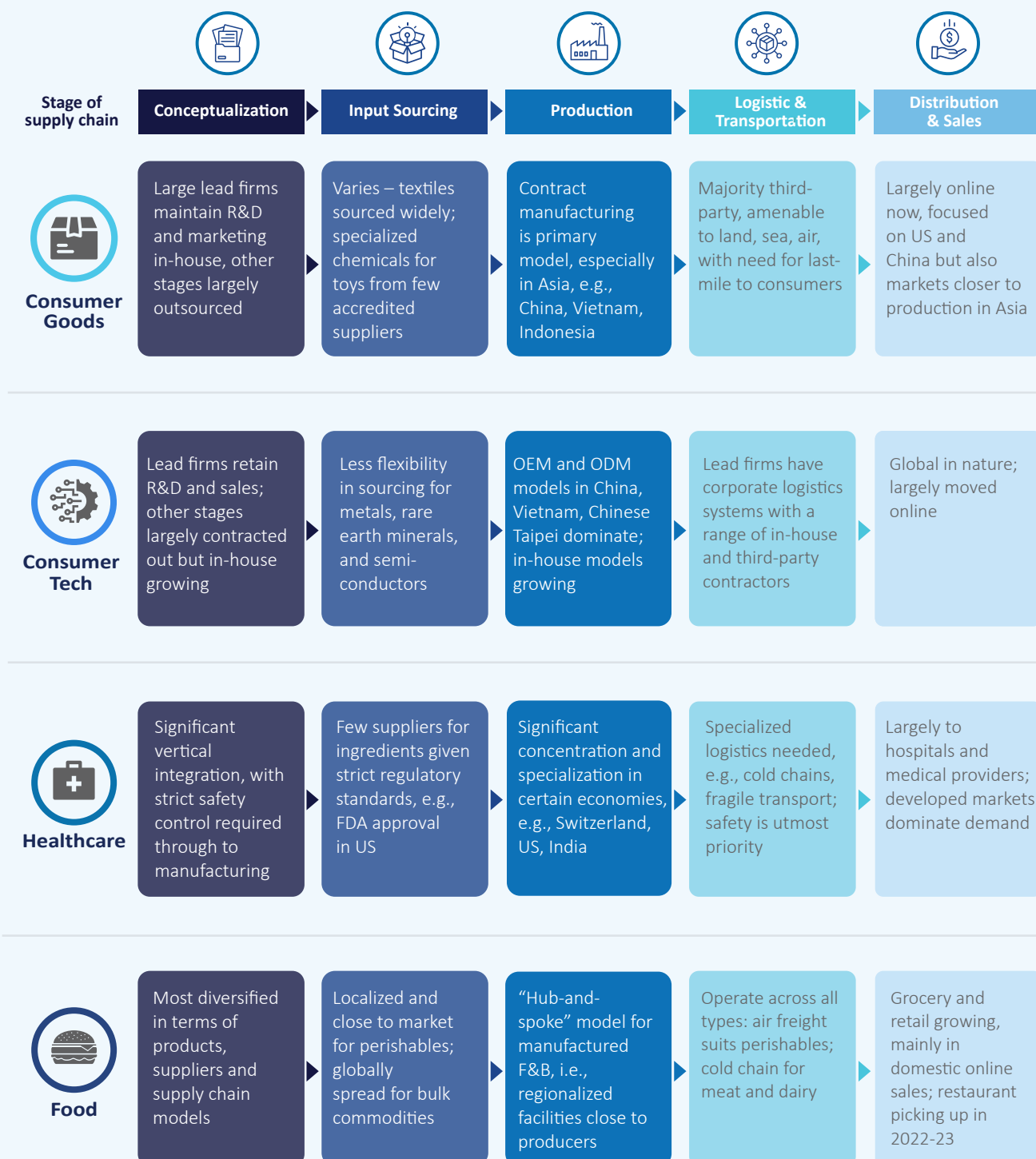


1. Papua New Guinea is excluded due to unavailability of comparable data.

SOURCE: International Trade Centre (2023), Trade Map.

Exhibit 2

Supply chain differences exist across segments



SOURCE: Interviews with lead firms and experts; Literature review; Access Partnership analysis

While multiple major disruptions have impacted supply chains in recent years, none were as widespread and severe as the COVID-19 pandemic. From as early as March 2020, travel restrictions, port closures, and movement controls across APEC members dramatically reduced freight and production capacity, leaving firms grappling with inventory issues across their extended supply chains.⁶ As stay-home orders and lockdowns became more widespread, demand pressures spiked, creating an even greater mismatch between demand and supply. The Global Supply Chain Pressure Index (GSCPI), which records the shifts in average transportation and logistics costs of key economies, reflects the impact of these disruptions – peaking in late 2021 at over four standard deviations above the mean.⁷ The cost of freight transportation reflected this convergence, with average 40-ft container rates peaking at above US\$11,000 in September 2021, five times in value since 2019, before finally settling down to around US\$2,000 only by the end of 2022.⁸

Lead firms in the four focus segments plus transportation and logistics experienced a variety of specific disruptions. Firms largely noted how “flexing capacity up/down” was essential to tackling disruptions, and that the free flow of products and continuity of essential personnel are important to enabling such flexibility.



Consumer goods

Firms in this segment faced manpower shortages due to factory or border closures brought about by safe-management restrictions. Other regulatory barriers limited the flow of non-essential goods. Some firms also experienced trade regulations such as tariffs and import restrictions, forcing shifts in sourcing and customer base.

Rapidly changing demand dynamics led by both the enactment and lifting of safe-management measures also created challenges in optimizing production capacity and meeting fulfilment needs.



Consumer technology

Similar to consumer goods, stringent safe management measures and periodic lockdowns contributed to significant reductions in production capacity. This affected firms with plants located across fewer APEC economies.

Even when finished goods were in stock, volatile demand and limited logistics capacity created challenges in distribution. In particular, the e-commerce boom created soaring demand for personal electronics which further strained logistics networks that were already struggling to cope.



Healthcare

During the COVID-19 crisis, healthcare firms faced economy-centric policies that created challenges in cost-effectively sourcing raw materials. On the one hand, firms were compelled to produce essential goods but on the other hand, they were shut off from key suppliers.

Most firms had to devote significant capacity to navigating the rules across APEC economies and “connecting the supply chain dots” themselves, rather than focusing their efforts on resolving production issues and supporting customer needs.



Food

Severe backlogs at seaports, exacerbated by ships skipping certain economies, limited export capacity including the timely export of perishable products. At the same time, volatile consumer demand, driven by fear of scarcity, also distorted market dynamics.

Supplies of inputs to and products from farms located in isolated rural areas were also severely restricted. In some economies, rigid distribution channels from pre-pandemic times also prevented the seamless diversion of food from restaurants to grocery stores.



Transportation and logistics

This sector is a critical enabler of supply chains. It played a key role during the pandemic, enabling the delivery of goods and essential goods such as personal protection equipment (PPE), medicines, test-kits, and vaccines around the world. During this time, transportation and logistics companies faced unprecedented operational complexity due to lack of regulatory coordination between economies.

Logistics firms also faced a severe reduction of air and ocean freight capacity due to the grounding of passenger aircraft, congestion at ports, and manpower constraints. The introduction of a Public Health Corridor concept by the International Civil Aviation Organization and the International Maritime Organization helped address some of these constraints, but these solutions were implemented unevenly across APEC economies and could not unclog the global traffic jam that had already developed.



2 Lessons learnt from past disruptions

Insights from lead firms

What did APEC's most successful businesses do to manage their supply chains during the pandemic? Their stories, based on qualitative research and interviews, offer important insights and are useful for identifying lessons from which both policymakers and business leaders can learn.

Key lessons for policymakers

Experiences during the pandemic revealed important lessons for policymakers whose interventions, or lack thereof, determined how well businesses were able to respond and cope toward supply chain disruptions. Policymakers should consider the following lessons from the pandemic and work closely with the private sector, especially those with established supply chain practices, in determining how best to respond to a crisis in the future.

■ Lesson 1: Wide variation in regulatory responses throughout APEC hurt supply chains.

As supply chains are intricately designed to meet regional sourcing, distribution, and delivery patterns that bring products to market, international business operations need common rules and regional coordination. During the pandemic, firms faced wide variations in travel and safe management measures across APEC economies. This greatly handicapped plant operations, ports, and transportation and logistics firms that operate networks to connect raw materials to production sites, and finished goods to distribution points for delivery to customers. Lack of policy coordination between governments made supply chain management for businesses a major challenge in forecasting labor needs and capacity decisions. For example, some economies enacted much lengthier lockdowns than others, creating uncertainty in border movements. Businesses even relocated production to economies with stable policies, often bringing supply chains closer to consumer markets to exercise greater control, sometimes foregoing cost efficiencies. These disruptions created great stress in an already difficult situation, which could have benefitted from a regional, APEC-level “control tower” mechanism to oversee coordination in policy responses.

■ Lesson 2: Policies that did not support flexibility in supply chain networks created vulnerabilities.

Policies tended to be designed without a deep understanding of how global supply chains work. Notable policy restrictions include export controls on critical goods as well as reshoring mandates which can exacerbate vulnerabilities within supply chains. While assessing resilience macroeconomically or based on broad sectors of domestic importance is important for governments to secure the best outcomes for their citizens, it can overlook the more granular complexities of global value chains that support major finished goods like drugs and consumer electronics. During the pandemic, restrictions preventing the export of personal protection equipment (PPE), medicines, medical equipment, and vaccines left healthcare firms, whose supply chains are deeply verticalized, with little room to redirect resources. It is worth noting that economies that committed to keeping borders open and maintaining the free flow of goods led the global charge in accelerating manufacturing capacity to supply vaccines both at home and overseas.



■ **Lesson 3: Cross-border movement of essential services personnel and coordination of transportation across markets is essential.**

Throughout the pandemic, global transportation and logistics firms faced significant challenges in continuing operations due to regulations that restricted aircrew, maritime crew, and trucking personnel from crossing borders. Although some economies acted quickly to provide solutions, frequent changes in travel history, testing, and vaccination requirements, coupled with a lack of understanding of the scope of services supporting international trade, created an incredibly challenging operating environment for logistics firms. This not only raised the cost of service but, in some instances, prevented economies from being served altogether. These measures also challenged manpower planning. For example, in July 2021, it was estimated that some 250,000 maritime crew remained on board commercial vessels and were forced to stay aboard past the expiry of their contracts because of regulatory restrictions.⁹ While cross-functional policy taskforces were established to deal with health outcomes, trade, transport, and labor policies did not respond adequately both within and across markets to support the normal functioning of long and geographically diverse supply chains.

■ **Lesson 4: Infrastructure gaps and limited distribution networks can prevent goods from reaching consumers.**

Businesses and logistics firms generally conduct trade out of markets with better infrastructure to keep costs low, especially during disruptions. Gaps in infrastructure or trade standards potentially make it more challenging or expensive for businesses to diversify into newer markets. As passenger airlines and ocean shipping ground to a halt during the pandemic, smaller and land-locked communities across APEC, which are reliant on these primary modes of transport for import and export, quickly realized their vulnerability. In the fall of 2021, APEC economies faced severe backlogs for exports and loss of perishable agricultural produce, creating concerns of being ‘underserved’ as ships skipped ports and increased blank sailings. Others explored a number of ways to connect land transport to more remote ports to provide more affordable shipping options for MSMEs. Further, due to lack of access to roads, local governments faced the challenge of getting vaccines distributed to vaccination centers in remote communities throughout APEC.

■ **Lesson 5: There is an urgent need to upgrade and digitize trade and connectivity infrastructure.**

While the pandemic accelerated the shift to more digitalized trade systems and networks, progress remains uneven. Gaps were more pronounced during the pandemic when physical production, fulfillment, shipping, customs, and delivery systems were overwhelmed by surging online consumer demand, despite APEC’s businesses digitalizing in greater numbers. Between 2019 and 2020, the value of online retail sales rose by 22% – far higher than in past years.¹⁰ In Southeast Asia, average delivery times rose by 11% to 120% between early to mid-2020.¹¹ The resulting manpower shortages from the effects of the pandemic further stressed the urgency of automation and digitization in manufacturing, logistics, and border agencies. This also involves agencies promoting supply chain transparency and coordination by leveraging and sharing real-time data to ensure stakeholders remain informed.

Key lessons for businesses

Lead firms interviewed for this research weathered the disruptions by adopting various tactics and solutions to boost flexibility, visibility, connectivity, robustness, and redundancy in their supply chains. These have been condensed into five broad lessons that other businesses could consider:

■ **Lesson 1: Companies should focus on supply chain resilience, building more flexibility and redundancy into their operations.**

As most firms have learnt, resilient supply chains involve coordinating a range of factors. Many firms have recognized that efficiency is no longer the “end-goal”, with some pivoting toward “just-in-case” models away from “just-in-time”. Others also look toward investing in redundancy by creating capacity buffers – be it in people, production or pipelines. At the same time, investing in geographical diversification for production is now considered a means of managing risk, with Johnson & Johnson pointing out how this can be a strength during a crisis, especially if governments facilitate expedited flow of essential goods. Exhibit 4 in the following Chapter shows on average, around 30% of firms in APEC across all segments became resilient on a number of indicators during the pandemic – including aspects related to digitalization and better business management, indicating a shift in priorities.

■ **Lesson 2: Businesses with real-time visibility with suppliers and partners could quickly respond to bottlenecks.**

Almost all lead firms use digital technologies to make data-driven decisions for real-time collaboration and responsiveness to identify chokepoints or vulnerabilities more quickly within their supply chains. The visibility allowed food companies to work with their host of suppliers and consumer-tech companies to switch across OEMs as restrictions emerged throughout the pandemic. In essence, firms that leveraged data and insights for transparency and supply chain planning managed to overcome disruptions. This approach resonates with many business leaders – according to a separate global survey of 71 supply chain executives across industries and regions, more than half indicated visibility as their top priority for digitalization initiatives.¹² This corroborates with on-ground observations – 35% of firms surveyed for this study adopted digital tracking technologies during or after the pandemic.



■ Lesson 3: Diversifying distribution models and transportation modes significantly helps businesses.

Flexible supply chains, especially those that do not over-rely on singular means of serving customer bases, allow businesses to respond more agilely to disruptions. A broad customer base is also critical, especially when disruptions suddenly impact core buyers, as experienced by firms in the food sector. The arrival of e-commerce taught businesses that there are multiple ways to reach customers. They range from the traditional Business to Business (B2B), and Business to Consumer (B2C), to Online to Offline (O2O) models. While some food companies were unable to pivot as quickly on the supply side from restaurants to grocery stores, others demonstrated great agility as restaurants found new customers by leveraging e-commerce platforms to deliver food to households. These models served communities well during the pandemic to get food, medicines, home office equipment, and other consumables to homes, and were important solutions for businesses. In addition, businesses typically switch between different modes of transportation depending on required lead times, volume, transportation costs, and other considerations. Maintaining a suite of transportation modes between land, rail, air, and ocean is critical to ensuring alternative means of getting to customers are always available.

■ Lesson 4: Businesses with robust business models were able to respond to disruptions quickly.

Businesses with models that allowed them to pivot to alternative customer bases, exercise more agile structures for more localized responses, and “flex up and down” their capacity found themselves most resilient to disruption. This also included identifying new avenues to generate leads and creating new ways to engage with consumers – for example, multiple healthcare providers were able to quickly adopt telehealth technologies to provide services at a distance during the pandemic. Amongst lead firms interviewed, Esquel doubled down on its expansion strategy with wider Asia and domestic markets in response to regulatory uncertainty. Hasbro decentralized its production decisions to teams based in larger markets to enable each site to operate and respond to their markets more directly.





3 Gaps in supply chain resilience today *Insights from business survey*

What is the current state of resilience among APEC supply chains in today's post-pandemic world? This chapter provides answers based on quantitative research, including a business survey conducted in June 2023 of over 1,000 firms of all sizes across 15 APEC economies

The impact of recent supply chain disruptions has raised significant questions over how businesses can adapt, respond, and recover from future disruptions. While Chapter 2 has outlined how larger firms in APEC have been able to enhance their supply chains to manage disruptions better, MSMEs, which typically have fewer resources to administer crucial changes, have not been able to keep pace. Business action is by no means the only determinant in the resilience of supply chains. However, understanding gaps in the state of resilience today can support APEC policymakers in strengthening policies to build supply chain resilience.

Box 1: Measuring supply chain resilience

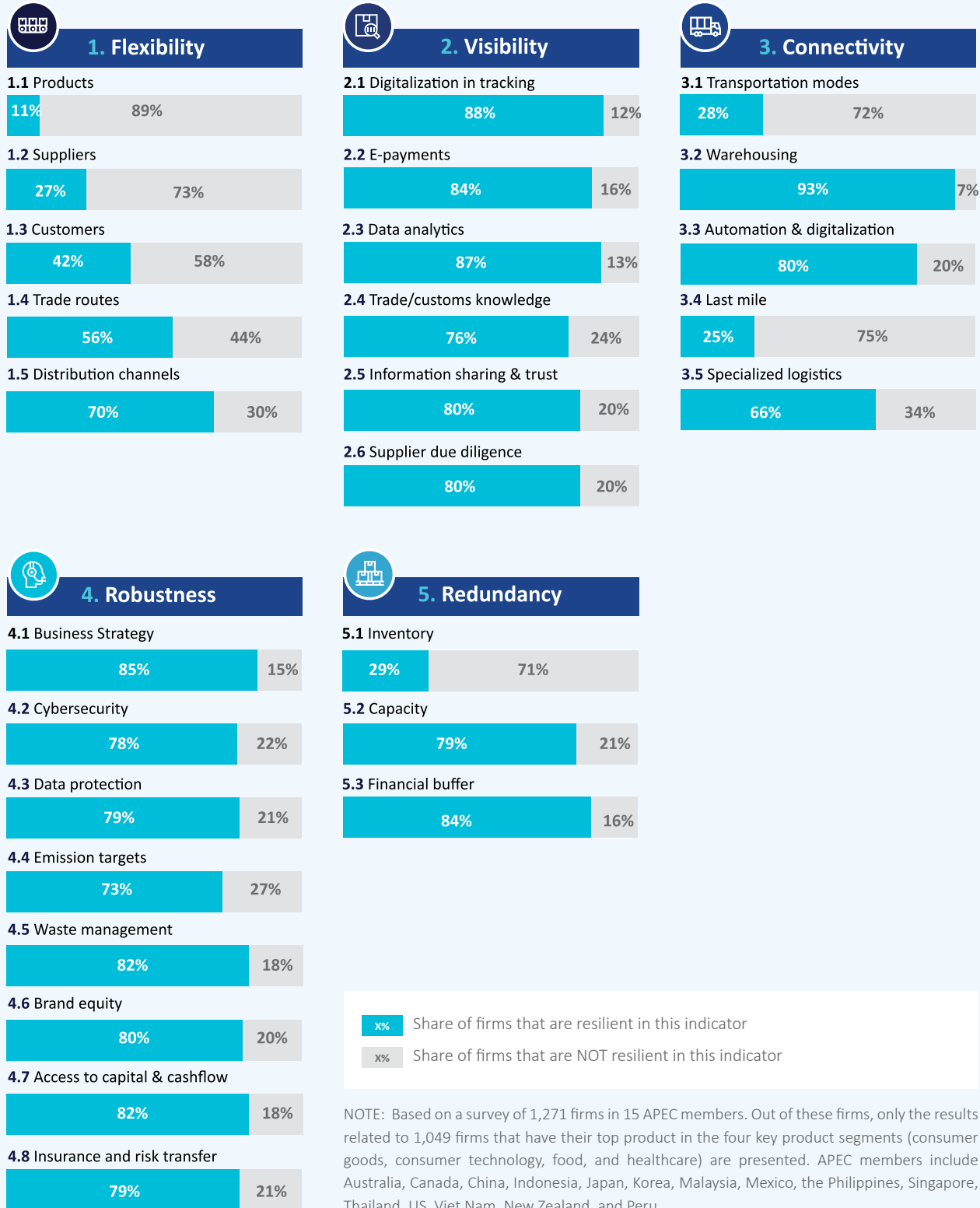


To understand the current state of supply chains' ability to withstand disruptions, this study uses a comprehensive framework to define supply chain resilience. The framework was first presented at the Second Meeting of the APEC Business Advisory Council (ABAC-II) in Brunei in April 2023. It is based on extensive review of the existing literature on resilience and in close coordination with lead firms in the industry. It adopts a holistic view of supply chain resilience across five key dimensions – flexibility, visibility, connectivity, robustness, and redundancy. These dimensions are underpinned by 27 indicators, which allow us to measure a firm's levels of resilience quantitatively and qualitatively. More information about each of these dimensions and indicators may be found on the dashboard for the ABAC Supply Chain Resilience Toolkit, available at: <https://supplychainresiliencetoolkit.ncapec.org/>

Exhibit 3

Resilience Scorecard: APEC supply chains

The level of resilience in APEC’s supply chains across four key product segments (consumer goods, consumer technology, food, and healthcare) reveals that while they are resilient across several indicators, critical gaps that need to be addressed exist.



The scorecard shows that resilience appears strong on indicators under the **visibility** and **robustness** dimensions, but relatively less so under connectivity and redundancy, while largely falling short under indicators for **flexibility**.ⁱⁱ There are a number of interesting trends to note:

- **Noted inflexibility under products and suppliers.** Across all APEC firms in these four product segments surveyed, only 11% are resilient on the **product** indicator, with their main product contributing to less than half of overall company revenue. The vast majority (89%) are potentially reliant on today's market demand of their limited core product to keep their business afloat. At the same time, only 27% of firms have more than one **supplier** for each of their critical inputs, highlighting a major supply chain risk for almost three-quarters of surveyed firms.
- **High dependence on few customers and markets.** At least two-fifths (42%) of firms rely on one key **customer** for more than half of their revenue – in even more extreme cases, 1.8% are dependent on just one customer for their entire revenue. At the same time, more than half of these firms are dependent on one key market (domestic or external) for more than half of their revenue. On average, the top three markets these firms typically trade in can take up at least 90% of revenue, signaling how **trade routes** can play an outsized role in determining their incomes.
- **Lack of diverse transportation options.** Only around a quarter (28%) of the surveyed firms have more than one logistics partner across each **transportation mode** they engage in (land, sea, or air) – the threshold for resilience on this indicator. In addition, 90% of all surveyed firms rely on **road transport**, the highest among all transport modalities, but nearly half of these firms have just one road transportation partner. **Last mile** infrastructure also appears to be a key bottleneck, where only a quarter of firms that engage in direct delivery are leveraging both in-house and external capabilities for their operations. Any disruption among their few logistics partners or networks will result in a significant risk for these firms – as the pandemic showed.
- **Current inventory levels can manage short-term disruptions.** Just 29% of firms surveyed reveal that they keep at least three months of inventory supply (both inputs and finished products) – the threshold for resilience on the **inventory** indicator. Lack of inventory is a contributing factor to how highly sensitive supply chains can be during periods of medium-to-long term disruptions. However, majority of firms (79%) set aside excess **capacity** (e.g., personnel staffing arrangements, factory production capacity) to prepare for disruptions. This implies how firm-level ability to meet demand is highly sensitive to flow of inputs rather than production capacity. Indeed, significant public-private sector coordination during the pandemic heavily focused on ensuring inputs could continue to flow across markets.
- **Digitalization ranks high on the agenda today.** The vast majority of surveyed firms use **digital tracking**, **e-payments**, and **data analytics**. They also have **cybersecurity** and **data protection** policies in place, and are also investing in **automation**, **digitalization** and connective infrastructure. This trend already began before the pandemic but accelerated during that time, as noted in Chapter 2. A large share of firms have adopted digital technologies since 2020 – around a third of surveyed firms (35%) have begun leveraging digital tracking tools, 36% commencing e-payments, and 31% leveraging data analytics tools (Exhibit 4).

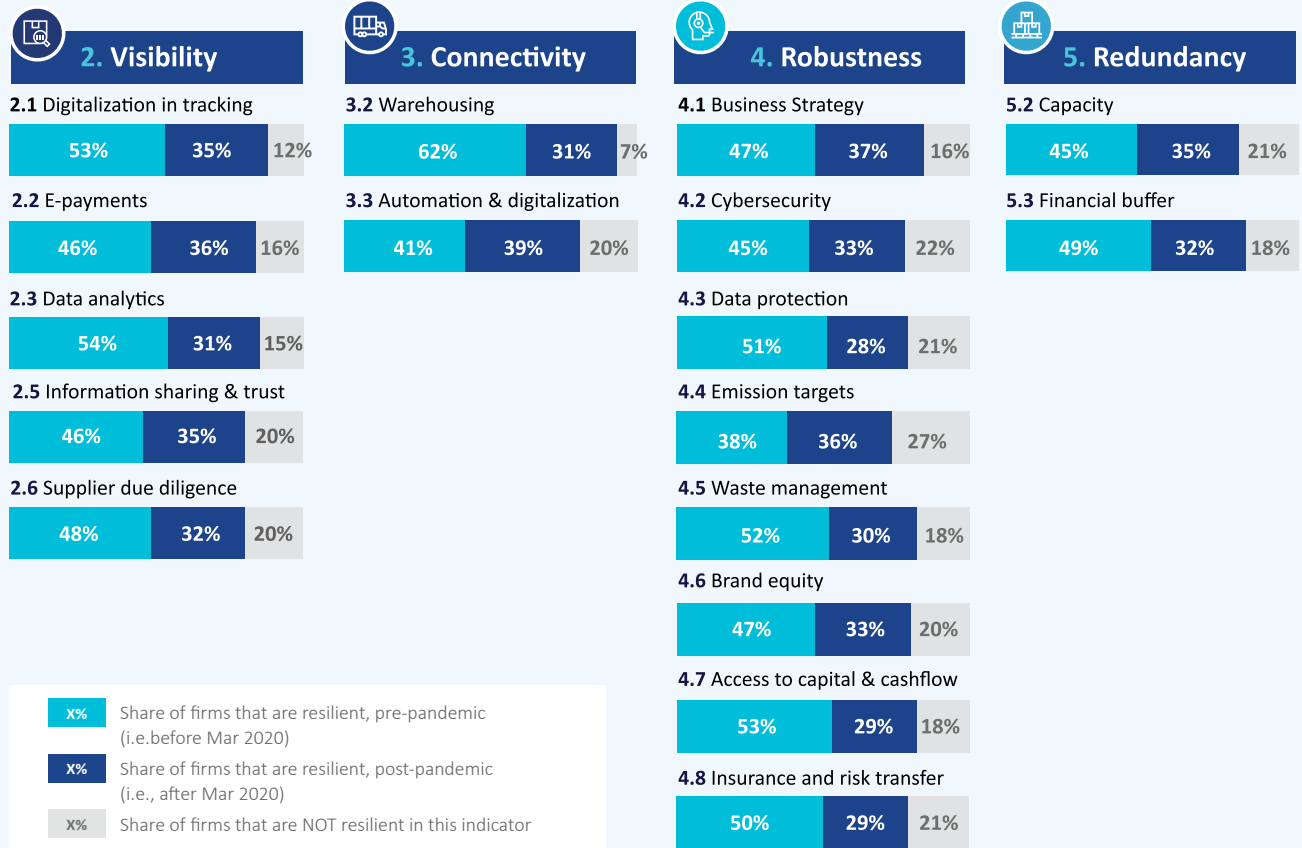
ii. Note that the results of the scorecard only reflect firms that mainly trade (i.e., their top product) in goods that fall under the four product segments, which amounts to 1,049 respondents out of 1,271 total responses.

Exhibit 4

More and more firms are investing in resilience across their supply chains post-COVID-19

Share of firms who are resilient in each indicator

Percentage, %



NOTES: Indicators listed here reflect ones that companies can implement or improve with relative ease post-COVID-19, and are predominantly applicable to any type of company regardless of product type or industry. Numbers may not sum to 100% due to rounding.

SOURCE: Based on a survey of 1,271 firms in 15 APEC members. Out of these firms, only the results related to 1,049 firms that have their top product in the four key product segments (consumer goods, consumer technology, food, and healthcare) are presented. APEC members include Australia, Canada, China, Indonesia, Japan, Korea, Malaysia, Mexico, the Philippines, Singapore, Thailand, US, Viet Nam, New Zealand, and Peru.



4 Five strategies for APEC to strengthen supply chain resilience

What should happen next? This chapter presents fresh recommendations for policymakers, building on extensive stakeholder engagement, as well as a review of best practice policies across APEC.

Supply chain disruptions remain a risk in the near term, but APEC can take steps to build greater resilience. The likelihood of future disruption to supply chains today is high. Supply chains continue to suffer from the after-effects of the COVID-19 pandemic, with poor macro-economic conditions, rising costs and prices, a lengthening conflict in Europe, and proliferating measures against free trade. Climate change, new pandemics, and other unforeseen black-swan events will also generate volatility for businesses in the future. Policymakers must therefore learn from recent disruptions, address gaps in supply chain resilience, and help global or regional systems and businesses be more ready for an uncertain future. As a regional institution, APEC can focus on five key actions to help strengthen the resilience of supply chains.

- **Ensure flow of trade and cross-border movement of essential services personnel are maintained during disruptions:** Ensuring that the movement of essential goods and services remains unimpeded is critical to keeping complex supply chains undisrupted. Almost half of the surveyed firms in APEC agreed that governments should commit to prioritizing trade flows during such periods. This is especially critical for essential goods that rely on a complex web of raw materials, parts and components, services, and personnel to reach a finished state and onto the final user. Here, APEC could facilitate the development of **pre-determined whitelists, “green lanes”, and essential services for sustaining the flow of product supply chains** that take effect only during periods of disruptions. Such features could also be integrated into APEC’s more recent work on Supply Chain Connectivity, which aims to support businesses in building secure and resilient supply chains. Aligning on such lists early is the main feature of this action to minimize regulatory uncertainty.
- **Establish a platform for regional cooperation and future-readiness, with initiatives developed in consultation with industry:** Because supply chains in APEC are largely contained within the region, regional responses and coordination are essential during emergencies. Establishing an **APEC playbook containing common rules and protocols, jointly developed with businesses**, to address future disruptions can mitigate the “domino effects” of unforeseen events or competing policy responses. The developed protocols must, as a foundation, prioritize business continuity and sustain international commerce. As an example of such protocols that have worked in the past; during the pandemic, some APEC economies worked proactively with air operators to develop solutions to sustain air cargo movement, taking these to the International Civil Aviation Organization (ICAO) for global consideration and adoption. The ICAO Public Health Corridor developed by the Council of Aviation Recovery Taskforce (CART) played a key role in minimizing operational disruption while keeping crew and communities safe. Although this agreement was non-binding, ICAO’s initiative is a best practice, and, where implemented, created the stability that businesses needed to function normally.
- **Digitize documentation, processes, and logistics services that continue to be highly manual:** The experience of online shopping and e-commerce fulfilment during the pandemic showed that a largely undigitized supply side fell dramatically behind highly digitized demand from online marketplaces. To address this enduring challenge, the decades-old focus on digitizing customs and trade processes across APEC must be accelerated. Since 2016, APEC has focused on paperless trade, e-commerce, and digital trade to help the transition to a digitally enabled trade environment, but much work remains to digitize trade processes from end-to-end, and across economies. APEC must move to integrate the region digitally or face more mounting complexities that could prevent interoperability. While this is a huge task, a **fully digitized trading ecosystem** will help eliminate redundant processes, enable visibility, and build resilience for businesses, while promoting flexibility and connectivity between economies. Finally, broader automation and digital transformation in transportation and logistics services also needs to be accelerated as production, warehousing, and transportation remain highly manual today, made evident when firms in this sector struggled to keep up with the overwhelming volume of e-commerce packages even before the pandemic.

- **Strengthen infrastructure and transportation connectivity:** Accelerating the development of APEC’s transportation and logistics network would improve the region’s resilience to supply chain shocks. Since 2009, APEC has worked on strengthening its physical connectivity, stressing the importance of strong coordination between trade and transportation policymakers to maintain supply chains. APEC could consider facilitating measures that promote simplified cross-border processes or even develop capacity-building initiatives to introduce unified digital processes at customs checks at ports of entry. Reinvigorating discussions towards **a multilateral agreement for air services liberalization** is also another important first step. APEC should also invest in infrastructure to support dangerous goods (DG) certified handling and cold chain transportation for transportation of essential goods during crises, as well as promote flexibility in international airport slots administration. APEC should accelerate discussions to secure more seamless and **efficient cross-border land and rail transport connectivity** to complement air and ocean options. Land and rail transportation services remain some of the lowest cost and most sustainable ways of moving goods across borders and could have contributed more greatly to resolving the global traffic jam leaving many communities underserved. New initiatives for nascent technologies should also be promoted, especially logistics innovation including unmanned aerial vehicles (UAVs), especially in economies with relatively less developed trade infrastructure and challenging geographical conditions (e.g., islands, spread rural areas).
- **Develop a framework for capacity building for MSMEs:** APEC’s MSMEs – themselves a source of diversity both as suppliers and customers – unfortunately suffered most from the effects of supply chain disruptions. While larger businesses relied on their scale to survive, the impact on MSMEs was severe and immediate. Many were impacted by supplier pressures, lost customers, and were not able to sustain business operations, let alone afford the rising costs of participating in international trade. Within just four months after the outbreak of the pandemic in 2020, almost 50% of MSMEs in the Asia Pacific region were at risk of financial insolvency with less than a month of cash reserves remaining. Many were forced to close – nearly two-thirds temporarily over 2020-22, and at least 10-15% permanently across APEC markets. Lead firms assisted their suppliers and customers where they could, but all cited significant challenges in providing long-term support. Supporting MSMEs in times of disruption is critical to maintaining business continuity and socioeconomic stability, while greater MSME participation in global value chains can enable greater diversification of suppliers and even customers. This year, ABAC has worked to comprehensively address the needs of this important business sector focusing on understanding the dimensions of supply chain resilience, sharing the stories and best practices of lead firms, and providing tools for benchmarking and capacity building. We invite APEC to assess these resources, available at this summary page on the Access Partnership website,ⁱⁱⁱ for our supply chain resilience.

iii. Access Partnership (2023), “APEC supply chain resilience” Available at: <https://accesspartnership.com/apec-supply-chain-resilience/>





5 Five strategies for firms to strengthen supply chain resilience

What can firms do to improve their own supply chain resilience? This chapter presents fresh recommendations for businesses, building on extensive stakeholder engagement, as well as a review of best practices across lead firms and MSMEs in APEC.

There are five strategies that firms in APEC, especially MSMEs, can consider to improve their supply chain resilience:

- **Measure your supply chain’s resilience and identify gaps.** The first step to building resilience in the future is understanding resilience today to understand gaps where additional investment can be targeted and impactful. It also ensures that firms can plan for the knock-on effects of interventions in any one area to others and avoid new bottlenecks; for instance, product diversification is only possible if connectivity and transportation options are developed in tandem. To support this exercise, NCAPEC has developed a Supply Chain Resilience Toolkit, which guides users through an assessment of their resilience across each of the five dimensions and constituent 27 indicators, providing clear areas for improvement and appropriate recommendations on how to improve resilience where gaps are identified.^{iv} These are the same indicators upon which resilience was measured at the APEC level, as presented in Exhibit 3 of this report.
- **Diversify what you sell, who you sell to, and where you buy from.** Firms can improve their supply chains’ flexibility by diversifying the products sold and suppliers they engage with, among other areas highlighted in Exhibit 3. Lead firms, for instance, responded to the pandemic’s challenges by redesigning their supply chains with these principles in mind. At times, they spent more than before as they expanded into new products and markets or bargained with multiple suppliers than in previous years to mitigate the risk of far more significant losses from potential disruptions in any of their critical nodes across their supply chains. Some firms reoriented their production lines to produce new goods, targeting newer sources of demand, or considered commercializing other aspects of their businesses. Strategies such as licensing out proprietary technology and providing advisory services to peers or smaller firms helped to both diversify their revenue sources and strengthen the resilience of their industry partners. MSMEs could similarly evaluate how their current supply chains can support the development of new products for their existing customers, the markets that they could most feasibly expand into, and the alternative suppliers they could most easily engage for critical inputs. NCAPEC’s Supply Chain Resilience Toolkit provides more detailed recommendations in each of these areas.
- **Maintain a “portfolio” of transportation options.** Maintaining a portfolio or suite of transportation options can help resolve a critical gap in firms’ resilience, in the event that their usual modes or logistics partners are unavailable. Survey data reveals this is also a challenge that typically affects firms with one major product, or one to two large customers or suppliers. Simple ways to do so include working with multiple logistics, specialized transportation, and last mile companies, and adapting products and packaging to fit multiple modes of transport, including air, sea, and land-based options. A more complex initiative that a lead firm undertook involved creating a “strategic logistics network” that combined fixed in-house resources for the most reliable demand with flexible outsourced resources to manage greater distribution needs during periods of demand volatility.

iv. NCAPEC, Access Partnership, UPS, J&J (2023), Supply Chain Resilience Toolkit. Available at: <https://supplychainresiliencetoolkit.ncapec.org/auth/>

- **Create end-to-end visibility through data and digital capabilities to help manage your supply chain.** Having stable and smooth connectivity as well as strong visibility across all stages of production and delivery is vital to a firm's overall supply chain resilience. Lack of coordination between sea/air freight and inland logistics was one of the key logistical bottlenecks created by the pandemic, especially during global port congestions in late 2021. To build efficiency and resilience across these linkages, lead firms integrated a range of digital tools to have stronger oversight at each stage of the process. These included new labelling of barcodes and QR codes that provided real-time product status, particularly for essential goods like vaccines. Such initiatives are relatively inexpensive and increasingly compatible with legacy product tracking systems, making it easy for MSMEs to adopt. Technology can also be leveraged to manage warehousing or the transfer of goods, thereby reducing downtime during labor disruptions, increasing efficiency, and improving the ability of firms to adapt to rapidly shifting demand during uncertain times. Flexible warehousing solutions provided by leading logistics firms offer MSMEs new solutions in this area, including those that require maintaining varying or seasonal inventory levels.
- **Align with leading or larger businesses to emulate industry best practices and develop joint advocacy.** Closer collaboration between larger players and MSMEs can help raise standards and enhance crisis response. For example, good manufacturing practices (GMP) certification, developed based on best practices that maintain standards of quality among manufacturers, are typically co-developed by industry players and authorities. Industry associations also facilitate collaboration between firms of varying sizes to highlight common issues or share experiences in tackling them. MSMEs, whether as competitors, customers, or suppliers, could also consider leveraging such platforms or engaging with larger businesses to identify common areas of vulnerabilities, co-create targeted solutions, or promote interoperability of supply chain systems. In a similar vein, MSMEs would benefit significantly from joining discussions with local business chambers, MSME associations or international fora for policy advocacy. Firms can rally together through chambers of commerce or local associations to facilitate dialogue with governments and multilateral organizations and discuss the latest trends and business bottlenecks that affect them most. As an example, the US Chamber of Commerce provides guidance on and organizes events for businesses of varying sizes to tackle industry-wide issues, and even runs sharing sessions between industry players to discuss the latest best practices. Alongside business objectives, such platforms also serve to facilitate input from industry for trade deal negotiations and inter-governmental efforts.



Appendix A:

Supply chain resilience framework

The resilience of a supply chain is typically defined by its capacity to resist potential disruptions by limiting the impact of and recovering from those the disruptions that do occur.¹⁵ In general, there are four “phases” of resilience – planning, absorbing impact, recovering, and adapting. This baseline definition has been used to define supply chain resilience in relation to trade by many organizations such as APEC, the Organization for Economic Cooperation and Development, the International Monetary Fund (IMF), the Organization for Petroleum-Exporting Countries (OPEC), and others, as well as a broad range of academic literature and professional services companies. A summary of insights from the prevailing literature is available in the main report of this study, while elaborations of each key dimension are provided below.



Flexibility: This dimension refers to the ability of firms to adjust their business operations to adapt to and minimize supply chain disruptions.¹⁷ Supply chain flexibility can be supported through greater diversification of products, suppliers, customers, trade routes, and distribution channels through which it reaches customers.



Visibility: This concept refers to the ability of an organization to track the flow of goods from the point of sourcing from delivery right to the customer (and even disposal or recovery).¹⁸ To this end, achieving visibility involves the use of technology and data analytics, internal industry expertise, information sharing, and conducting supplier due diligence (i.e., identifying supplier-related challenges).¹⁹



Connectivity: Having stable and smooth linkages across all stages of production is vital to a supply chain’s overall resilience. Lack of coordination between sea/air freight and inland logistics was a logistical bottleneck revealed in the pandemic.



Robustness: This dimension involves pre-emptively minimizing the impact of disruptions by institutionalizing key internal processes that focus on longer-term survivability. Firms can enhance robustness by developing long-term business strategies, focusing on sustainability, building a trustworthy brand reputation, and adopting cybersecurity capabilities to support digital transformation efforts.



Redundancy: This refers to the availability of excess capacity or resources to sustain or enhance the other four dimensions of supply chain resilience during disruptions. Many firms are increasing investment in buffers across different nodes of their supply chains by maintaining buffers in inventories, utilizing the lower capacity to mitigate system failures and capture demand cycles, or having financial buffers.²⁰

Appendix B:

State of resilience survey

To better understand the state of resilience in healthcare supply chains within APEC members, a survey was conducted for this study in June 2023. The survey respondents included 311 healthcare firms located in 15 APEC member economies, which include: Australia, Canada, China, Indonesia, Japan, Korea, Malaysia, Mexico, the Philippines, Singapore, Thailand, US, Viet Nam, New Zealand, and Peru. The total sample closely resembles the GDP proportion of each economy and to be representative of APEC's overall supply chain. A breakdown of these respondents by economy and business size is given in Tables B1 and B2.

TABLE B1

Economy	AU	CA	CN	ID	JP	KR	MY	MX	PH	SG	TH	US	VN	NZ	PE
No. of respondents	31	33	145	120	93	100	49	91	74	51	136	170	91	30	37

TABLE B2

Firm Size	Micro- and small-sized firms	Medium-sized firms	Large-sized firms
No. of respondents	412	707	152

TABLE B3

Category	Healthcare	Food	Consumer technology	Consumer goods	Others
No. of respondents exclusively under this group	188	313	292	-	222
No. of respondents in this group along in other categories	311	452	463	193	225

Appendix C:

Lead firm stories on supply chain resilience

Consumer goods

Hasbro: Leveraging digitalization and diversification to strengthen supply chain responsiveness

Hasbro Inc. is a global play company best known for iconic brands like MAGIC: THE GATHERING, DUNGEONS & DRAGONS, Hasbro Gaming, NERF, TRANSFORMERS, and PEPPA PIG. As one of the world's largest toy and game producers, the company runs an asset-light business model, owning no factories anywhere in the world. While Hasbro manages product design (“creativity”), marketing, and sales internally, it relies on select partners for other stages of the supply chain, including manufacturing and logistics. Hasbro has a robust supplier due diligence process, particularly for its factories, to maintain ethical standards of production and establish long-term partnerships. It sources resin materials for toys mostly from China, South Korea, and Chinese Taipei, while other inputs like paper and colorant materials are sourced closer to production sites in China, Vietnam, and India, as well as in the EU, US, and Mexico. The US accounts for 50% of Hasbro's revenue.

Toy supply chains are often characterized by short product lifecycles, highly concentrated seasonality, and significantly large number of product lines. For Hasbro, the COVID-19 pandemic overlaid additional complications that significantly disrupted its supply chains. For instance, labor disruptions brought about by rapidly changing public health protocols led to reductions in manufacturing capacity. Uncertainty and changing pandemic measures also challenged Hasbro's ability to solicit alternative sourcing and to estimate consumer demand that spiked due to the very same social restrictions. Further issues arose when ports congestions slowed movement of products. In the second half of 2022 – as travel returned and inflation soared – demand declined rapidly, requiring yet a different response from Hasbro.



To facilitate better flexibility, visibility, and response to fluctuating demand and supply, Hasbro has undertaken the following initiatives:

■ **Moved to create visibility across its value chain through digitalization:**

To prevent skilled labor shortage from impacting production and shipment capacity, Hasbro introduced a range of digital tools, including real-time tracking of shipments moving in and out of ports, smart automation in the production process, and forward-looking capacity planning leveraging demand and supply data. The aim is to make production lines more resilient to external shocks.

■ **Upgraded local production teams while diversifying production sites and its product portfolio:**

Hasbro upgraded its production sites in China, India, and Vietnam to enable them to operate independently and be able to respond demand changes. Further, to be closer to the US, its largest market, the company is setting up similar production capabilities in Mexico. Within its network of factories, capabilities have also been reoptimized to reflect localized demand patterns and to leverage alternative sources of revenues during periods of downtime.



Esquel: Turning disruption into opportunity

Esquel Group is a Hong Kong-based textile and apparel manufacturer, operating a fully integrated global supply chain spanning raw material sourcing, yarn spinning, weaving & knitting, garment manufacturing, and trade & distribution (Exhibit C1 describes the general apparel supply chain). The vertical integration enables the company to serve global buyers by maintaining high levels of quality control and economies of scale.

The company's primary markets have changed significantly in recent years, deeply impacted by trade measures restricting market access to the US, which typically accounts for a third of the company's revenues. The pandemic exacerbated these challenges by raising the costs of shipping and product movement, making it far more challenging to manage a long supply chain that spanned over China, Mauritius (due to favorable trade agreements), and the US. Together with shifts in industry buying patterns, these disruptive trends have driven a complete re-think of the company's business model.



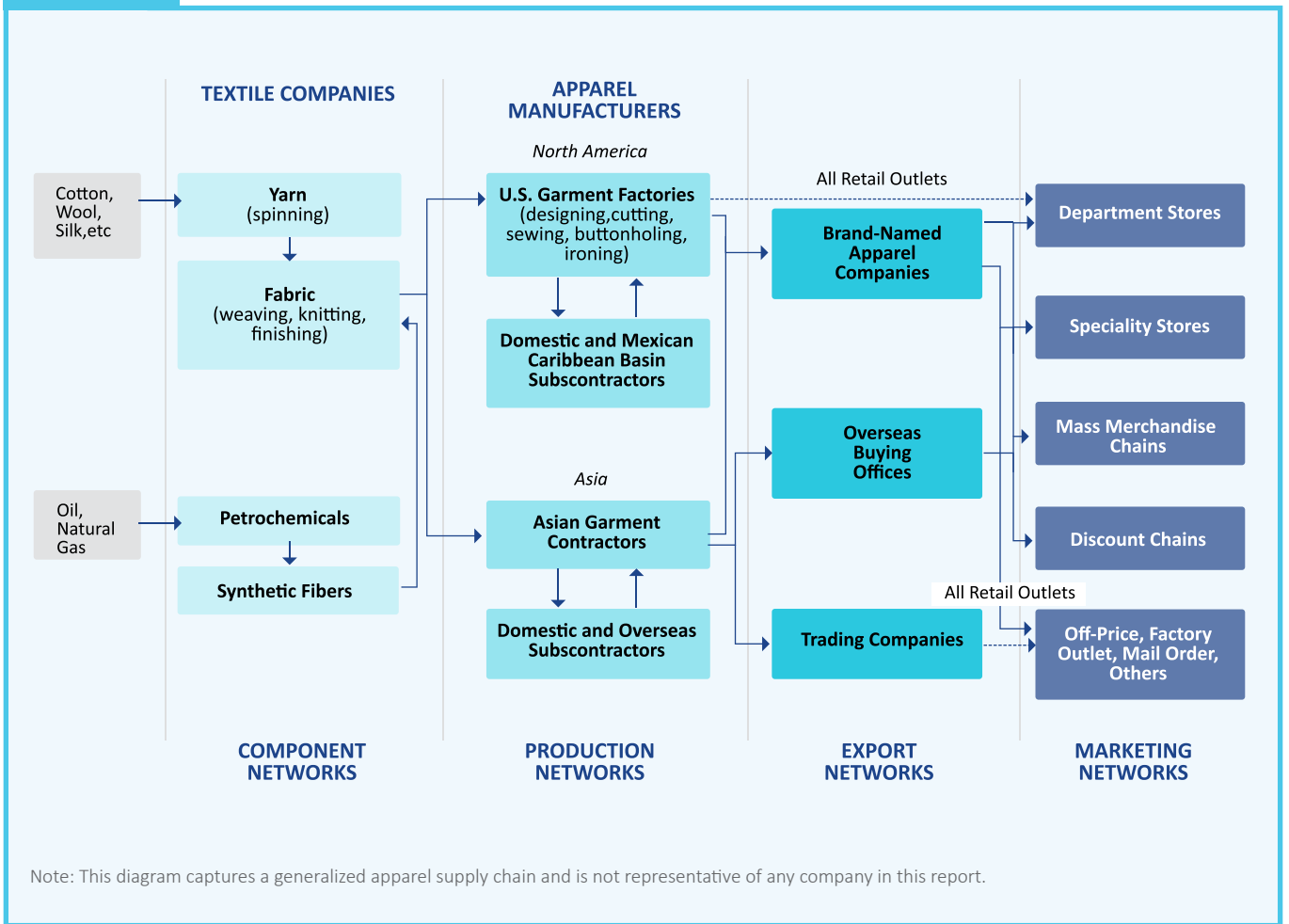
ESQUEL GROUP



In response to these disruptions, Esquel adopted three changes to incorporate flexibility and diversification:

- **Reshuffled operations and diversified into regional markets.** Due to ongoing trade restrictions, the company closed three of its facilities in Mauritius, Malaysia, and Sri Lanka. The company then doubled down on its regional expansion strategy, bringing greater production and delivery capacity to other markets, requiring strengthening of its export and marketing networks.
- **Value chain expansion into retail.** While the company had always maintained an in-house brand, this division became an even more important part of its business and important go-to-market strategy. By developing in-house sales teams and reaching customers directly through brick-and-mortar stores and e-commerce, the company is now focusing on expanding its retail capabilities. This shift in strategy has the added advantage of a more efficient supply chain supporting a more agile response to market changes.
- **Created new sources of revenue.** The company has consistently and heavily invested in technology and innovation. For example, through automation and robotics, the company aims to raise productivity of workers in the apparel industry while novel environmental solutions such as waterless dyeing could greatly contribute to making the industry more sustainable. As the company pulls back from manufacturing and the OEM business, Esquel is commercializing its proprietary technologies that are unencumbered by its legacy business as a form of diversification as well.

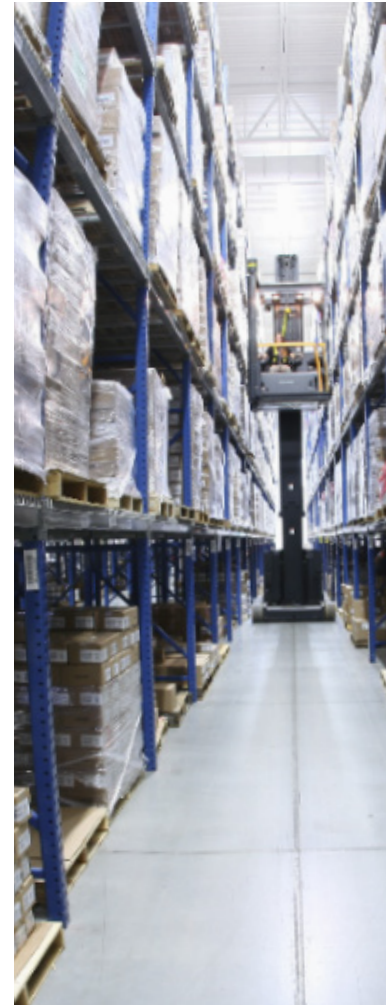
Exhibit C1



Global consumer goods conglomerate: Balancing globalization-localization opportunities

The Company is a global conglomerate with diversified consumer goods. The Company's garment segment activates a globally intricate supply chain, sourcing mainly from China, Vietnam, Bangladesh, and Turkey to serve its markets in Japan, China, ASEAN, as well as EU and the US, with Japan being its largest market. Its garment business uses both OEM and ODM models, but The Company oversees all production processes from materials sourced to finished products; in particular, its partner factories have onsite production quality controls in place to ensure consistency.

The Company faced a number of disruptions during the COVID-19 pandemic, and the chief impact was the shutdown and/or closure of its factories due to pandemic-related labor restrictions. Many factories had to suspend their operations at times or shut down completely as their financial health collapsed without sufficient output. Increased transportation costs for the limited material it could source or produce further compounded challenges at all stages of manufacturing. In addition, uncertainty and restriction of logistics capacity across global supply chains impacted The Company's on-time delivery for both materials and final products, damaging consumer confidence. The Company is also facing intensifying pressure to demonstrate corporate social responsibilities, with consumer goods and particularly apparel supply chains around the world facing ethics investigations. All these factors have contributed to soaring product prices.



In response to these disruptions, The Company leveraged its global networks and scale and took following actions:

- **(Re)configured a flexible production portfolio.** The Company diversified its material sources, production sites, transportation methods, and sales to distribute supply chain risks caused by uncertain regulations. It increased the number of partner factories for each production component in multiple locations to avoid a complete breakdown of the supply chain during times of a lockdown in a market. Each extension of a partner was based on the assessment that the new factory demonstrated a similar level of capabilities and product quality. This has involved shifting part of its manufacturing processes from China to ASEAN economies – and this is accelerating.
- **Integrate end-to-end production in each market.** Due to rising costs in fuel, materials, and logistics, The Company saw it best to decrease wasteful processes like additional movement of goods. It is now building supply chains that facilitate local consumption of locally produced goods to save resources and time. Although localized supply chains are not a new concept, the pandemic has accelerated the shift towards them to maximize potential uniformity of regulations.
- **Invested in digitalization.** Digitalization through the use of new technologies prevented loss of economies of scale and unstable quality control for The Company that shorter, localized supply chains could potentially have brought. In the sampling stage, the use of 3D patterns helped eliminate sample production and shipping processes and the accompanying costs. Digital management tools and automation has increased productivity, while fortifying the overall supply chain's resilience against labor shortage. Digital communication tools also increased The Company's oversight capacity by enabling smooth and frequent communication across production sites.

Global sportswear brand: Prioritizing forward-thinking resilience

The Company is a global seller of sports goods, principally footwear and apparel. It largely operates a contract manufacturing business model, retaining control of product design, R&D, and marketing. The Company's footwear segment predominantly engages with dedicated partner producers (i.e., outsourced factories) in Asia, sourcing mainly from Vietnam and other parts of Southeast Asia. Its apparel business also similarly engages with partner producers in these regions that supply multiple brands. It exercises strong oversight over its Tier 1 or finished goods suppliers through quality and delivery controls, while also engaging with Tier 2 or component suppliers that produce high-tech fabrics and other inputs such as laces.

The Company cited both trade tariffs and the COVID-19 pandemic as major disruptions. Its products were already subject to high tariffs for its top market, the US, but these increased even further in 2018. Such tariffs act as a barrier to the competitiveness of manufacturing in Southeast Asia – well outside its demand centres – impacting The Company's ability to invest in infrastructure and systems to build resilience. Lockdowns in key manufacturing markets significantly impacted The Company's suppliers, with many factories being forced to temporarily or permanently close due to prolonged capacity constraints. At the same time, a spike in demand from consumers staying at home depleted existing inventory, while logistics capacity constraints created by the grounding of air and maritime transport created soaring transportation costs and significant delivery delays. As production resumed service, companies faced immense pressure to rebuild inventory to meet demand backlog and service continuing consumer appetite, in turn placing significant pressure on supply chain and logistics capacity that was yet to return to full strength. This culminated in a supply chain crisis where ports across the world, including Port of Los Angeles, faced severe congestion in late 2021. As orders were cancelled and demand subsided, The Company was left with significant additional inventory in 2022, which it has only recently been able to manage.



The Company was largely able to tide through these challenges through existing initiatives that pre-dated these disruptions, including:

- **Engaged fewer, but larger capacity producers.** Over time, The Company has strategically reduced its direct factory partners by over 50%. The aim of this exercise was to maintain overall capacity through dedicated factories on which it can exercise greater oversight, forge closer relationships, and leverage economies of scale. The factories remain geographically diverse to hedge risks
- **Consolidated position in new centres of demand.** The Company has increased investment in expanding its market share in large Asian markets, shortening its supply chains while mitigating the increasing impact of tariffs in the US. It has also been increasingly engaging in direct-to-consumer sales through its online store, complementing its conventional third-party distribution network.
- **Advocated for free and inclusive trade to build resilience.** The Company is a strong believer in free trade, regularly engaging with governments to provide its perspectives on deals such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), Regional Comprehensive Economic Partnership (RCEP), and Indo-Pacific Economic Framework for Prosperity (IPEF). It also advocates free flow of information and sharing of best practices between lead firms, MSMEs, and public agencies during times.





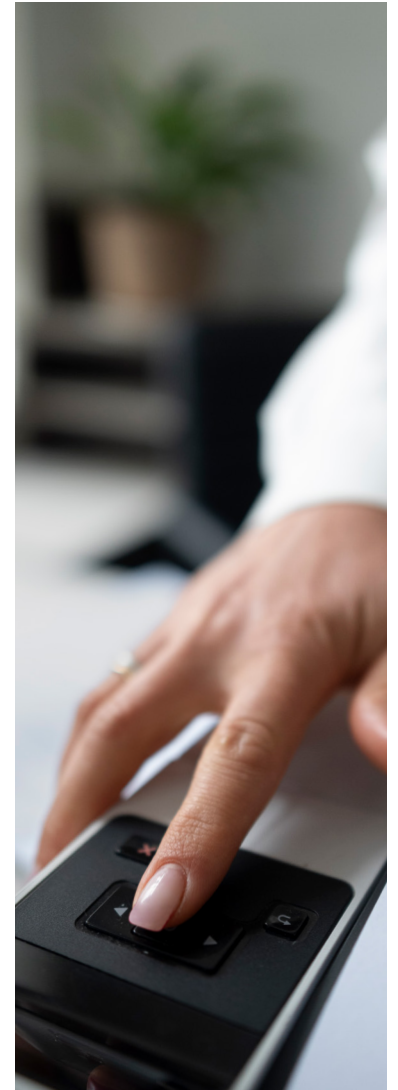
Consumer technology

Global consumer technology manufacturer: Diversifying and strengthening supply chains

The Company is a global technology company specializing in consumer electronics, software, and related services. Its consumer technology business includes the printer business unit which predominantly operates as an Original Equipment Manufacturer (OEM) without its own manufacturing facilities, although it engages in original design manufacturing and in-house production operations as well.

With key manufacturing bases across Asia, most of the Company's printers are manufactured in Vietnam and China. More recently, like other several consumer electronic brands, The Company has started to conduct in-house manufacturing, enabling the company to exercise greater control over its supply chain, quality, and price – all in an effort to reduce its reliance on external OEM partners. A significant share of its distribution network is handled by its own corporate logistics network.

The COVID-19 pandemic presented the printer business with a range of challenges. Pandemic-era prevention measures, including lockdowns in APEC economies which prevented workers from entering factories, leading to severe backlogs of production. Even when finished goods were in stock, effective inventory management based on the was difficult due to capacity constraints in transportation and logistics. Another challenge arose when competitors responded by slashing prices to encourage sales, placing immense pressure on the printer division to maintain profitability.



The printer business was relatively well prepared to respond to these disruptions with three major strategies:

- **Sourcing for goods flexibly:** With majority of production in China, the Company's printer supply chains had been engaging with OEM partners in Vietnam even before the pandemic to hedge supply chain risks. This helped mitigate the impact of lockdowns in China during the pandemic as it could source product from OEM partners in Vietnam, and vice versa engaging with local suppliers and leveraging OEM stocks when Vietnam in turn entered its own set of lockdowns. During periods of heavy price competition, it shut off its Weihai operations in China altogether to rely on OEM capacity.
- **Utilized in-house logistics network for visibility and strategic inventory management.** Capitalizing on its dedicated network of logistics firms that manage transportation and warehousing, business units across the firm could manage inventory needs against market demand more efficiently. Strategic inventory management based on understanding demand trends in key markets enhanced the Company's competitiveness when competitors lacked stock and could not produce at full capacity.
- **Developed overseas market diversification plans.** While the in-house printer unit at the Company largely serves domestic demand in China, the business plans to engage with various international distributors to sell its branded products to other economies to power the next phase of growth. Depending on volumes, it could even consider establishing manufacturing capabilities in local markets.



Healthcare

Johnson & Johnson: Prioritizing and reinforcing to weather the storm

Johnson&Johnson

Johnson & Johnson has been actively engaged in addressing times of health crisis for over a century. As the world's largest, most diversified healthcare products company, they have a global reach and unique ability to leverage deep scientific expertise and extensive partnership. Most recently, Johnson & Johnson mobilized and tapped into their network of more than 130,000 employees around the world towards mitigating the impact of the COVID-19 pandemic.

Role during pandemic

At the onset of the pandemic, Johnson & Johnson worked to develop and deliver a COVID-19 vaccine for global populations that was easily transported, stored using standard refrigeration, and combined with its efficacy, was uniquely positioned for ease of deployment in any setting. 80 percent of their vaccines have been delivered to low and lower-middle income economies at non-profit pricing or via donations.

Approach to supply chain resilience

The company was able to successfully support the needs of the patients, customers, and communities despite the unprecedented challenges of COVID-19. They attribute this to the robust Business Continuity Planning (BCP) processes they had in place prior to the pandemic. It also actively monitors its end-to-end supply chain during a major events to ensure they are maximizing product availability, producing and delivering the right volumes of the medicines and devices that people need. These efforts include:



Examples of Johnson & Johnson's efforts to strengthen its supply chain resilience include:



Flexibility: Johnson & Johnson teams incorporated a high degree of flexibility in supply chain planning, including pre-positioning supplies, pre-staging and pre-clearing alternate shipping methods and routes, and harnessing digital capabilities to monitor sales patterns and order flows to avoid unnecessary stockpiling that may lead to patient shortages. .



Working closely with governments and suppliers: Johnson & Johnson teams ensured sufficient coordination and intelligence gathering with appropriate Government partners, and negotiated where necessary to ensure free flow of goods and services across borders. It also worked cooperatively with their suppliers to expedite shipments, and maintained BCP commitments for key primary and secondary suppliers.



Maintaining sufficient buffers: Including dual sourcing for key manufacturing steps and dual source locations for key raw materials (or inventory), maintaining inventory levels by enabling alternate sites to cover demand, where available; ensuring backup line(s) within existing sites (with available capacity) for key manufacturing steps; maintaining sufficient inventory levels; and having spare parts for critical equipment.



Investing in visibility: In response to Hurricane Maria in late 2017, the company's supply chain teams used digital tools to track the exact location of emergency supplies and products heading to or from the Puerto Rico to help automate business continuity efforts and ensure it continued to supply products on time to customers. Together with significant investments in digital and data science capabilities, this approach informed their response to the pandemic and enabled end-to-end visibility for the entire portfolio.

See the full Johnson & Johnson case study in *The State of Healthcare Supply Chains in APEC* report.^v

v. NCAPEC (2023), State of Healthcare Supply Chains in APEC. Available at: <https://ncapec.org/state-of-healthcare-supply-chains-in-apec/>





Food

Global grocery retailer: Building partnerships through data-driven decision making and visibility

As a global grocery retailer that serves 20 markets around the world, The Company's supply chain strategy is to "keep it short and local" where possible to minimize miles and play to the perishability of food products. Certain types of perishables, such as bananas, have much higher import intensity, typically because they are not compatible to be produced in destination markets or due to the seasonality of production.

The Company recounted the major challenges experienced by the food industry during the early stages of the COVID-19 pandemic, particularly in the US. Due to the ways in which US food systems are organized, the company had little room for flexibility to shift between foods destined for restaurants and those for retail (i.e., grocery), making it difficult to respond quickly to lockdowns and social restrictions. Another challenge was the fear of scarcity driven by the disruption that dramatically contorted consumer behaviours. These asymmetric shocks created deviations from The Company's demand predictions and increased volatility in supply chains that were inherently designed for specific efficiencies.

However, The Company was well placed to respond to these challenges through robust existing operating strategies, including:

- **Diversified suppliers in advance.** Given the importance of local supply chains, The Company had long been operating programs to build and strengthen local suppliers, while establishing sourcing hubs for staples in multiple markets. These backup supplier bases were activated flexibly, for instance allowing procurement of grapes from Chile without disruption when major challenges were experienced in Peru.
- **Invested in its relationships with external partners.** The Company has maintained strong, hands-on relationships with its suppliers and merchants, whose support improved The Company's supply chain visibility and flexibility in response to shifting demand. It conducts thorough due diligence on its suppliers for compliance with rigorous internal and external standards and has various business financing programs in place to incentivize supplier participation.
- **Leveraged a holistic sourcing approach using data.** The Company has developed a long-term, holistic, and robust sourcing approach using extensive use of data analytics, forecasting, and information sharing. It applies quasi-mathematical perspectives to gauge yearly product demand and map out potential risks like geographical and supply dependencies, giving it ample information to not only manage inventory to satisfy consumer demand but also prepare for potential disruptions. Furthermore, its analysis accounts for exogenous factors like climate risk and shares these insights with its suppliers, enabling its entire supply chain to be future-ready.



Transportation & logistics



UPS: Building resilience as a core strategy

UPS – a global leader in transportation and logistics- operates in more than 220 economies, offering end-to-end express delivery and innovative logistics solutions to customers, big and small. The company's 394,000 employees in the APEC region, including in the United States, Asia, Canada, and Latin America, play important roles in connecting businesses, consumers, and people to the global marketplace. UPS Airline and its fleet of over 500 aircraft operate a global air network around the world.

Although APEC economies quickly recognized 'logistics' as an essential service to sustain trade and commerce, the company had to overcome many operational challenges that persisted throughout 2020 to 2022. These were exacerbated by escalating demand and severe capacity constraints as passenger travel grounded to a halt and corresponding passenger airline 'belly' space – typically contributing half of global air capacity – was eliminated from the market. On top of these market realities, the constantly changing regulatory requirements created challenging conditions for sustaining business continuity. Fault-lines in the broader transportation ecosystem including in the maritime and multimodal transportation sector contributed further to the 'global traffic jam' and supply chain disruption.

The company owes its success to the strength and resilience of UPS employees in the APEC region who withstood quarantine conditions, lockdowns, and closed loop management, but continued to serve under some of the most difficult conditions for many months at a time. Close partnerships with government stakeholders throughout the region also allowed for joint development of solutions facilitating the safe passage of essential personnel and delivery of critical goods to communities.



To build future resilience, the Company is focused on the following:

- **Promoting flexibility in its transportation network:** Although a global air network offers built-in flexibility, UPS continues to evaluate its operation, working with customers to identify vulnerabilities, manage risk, and strengthen contingencies. Between 2022 and 2023, the company expanded operations across several air hubs to strengthen its air network. It also continues to seek out and strengthen partnerships throughout the Asia Pacific region to incorporate additional flexibility, agility, and responsiveness into its network to meet customer needs.
- **Supporting digital visibility for its customers:** To boost its ability to respond to changes in demand and supply and enhance visibility, UPS invested in tools to support the digitization and integration with customer supply chains. In December 2021, UPS opened its Asia Pacific Innovation Center in Singapore to incubate, test, and deploy next-generation technology to help customers accelerate their digitalization journey. These technologies will improve processes, streamline inbound and outbound logistics operations, order fulfilment, and inventory checks. To support small businesses, UPS helps e-commerce businesses by providing them with a one-stop solution for order management, delivery and tracking.
- **Deepened engagement with governments:** UPS believes we must learn from the lessons of the pandemic and act as a region to prepare for future disruptions. As such, the company has been an active voice in international fora such as the APEC Business Advisory Council (ABAC) on the importance of governments consulting more closely with businesses, understanding root causes for systemic failures, and responding collectively as a region.



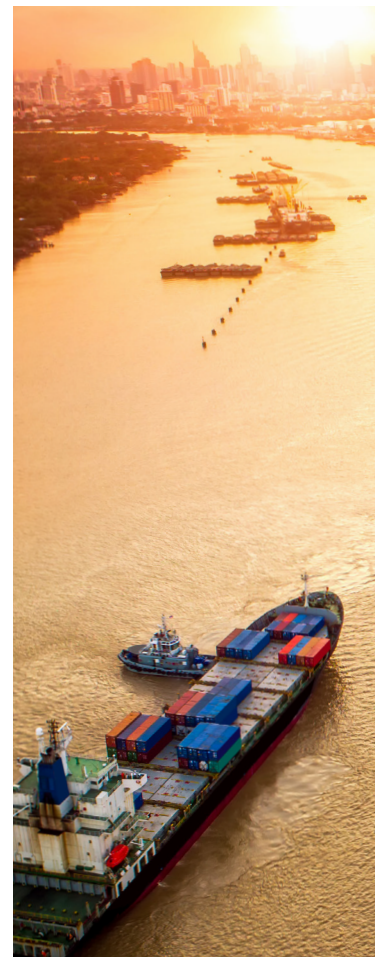
Global maritime shipping and logistics company: Accelerating digitalization and future-proofing operations

The Company is one of the world's third-largest container shipping company, representing more than 10% of the current global container ship capacity. Operating in over 100 markets, the Company provides multiple logistics services and solutions, including maritime and airfreight shipping and cold chain logistics.

Pandemic-era supply-side restrictions on labor and capacity constraints on airfreight due to airlines being grounded, together with uneven border closures, significantly damaged the predictability of all maritime logistics firms' operations, including for this Company. This created significant cargo space shortages throughout the pandemic and fueled congestion at ports. On the other hand, with e-commerce demand surging due to people being locked in their own homes with greater disposable income due to a lack of leisure travel, an ever-greater volume of household, electronics, and personal health goods required transportation. As experienced by firms across the board, logistics costs soared during this period and have only recently begun to return to normal ranges.

Maritime logistics companies were able to respond to these disruptions by capitalizing on pre-pandemic trends, including:

- **Accelerated digitalization.** Before the pandemic, many parts of the logistics industry, like customs clearance, invoicing, payments, meetings, and customer communication, were slowly transitioning from paper-based and face-to-face interactions to digital means. This transition was “supercharged” during the pandemic – firms (and indeed governments) had to digitalize quickly as interactions moved online to facilitate business continuity.
- **Increased access to trade financing by collaborating with fintech companies.** To support clients and partners with limited financial capacity in freight forwarding during the pandemic, carriers like this Company connected them to fintech firms to access trade finance at marginal interest rates through innovative new products. As a result, the Company would get paid in full and on time while MSME freight forwarders remained in business.
- **Embraced future workforce and ESG challenges.** Considering that work from home is settling into a new norm, companies have to adjust their operations to retain skilled labour in the logistics industry. As such, the Company now offers work from home and a flexi-hour scheme and is also investing in its employees' mental health and well-being. Furthermore, growing consumer and regulatory demands to create sustainable and ethical operations provide an additional push for companies to assess and redesign their business practices to remain competitive. Recognizing this, the Company is a leading proponent of emissions reduction in the logistics sector, aiming to be carbon neutral by 2050 and to source 10% of its energy from alternative fuels by 2023. It is the first company to integrate dual-engine vessels into its operations, utilizing ships that depend on both LNG and methanol to minimize its environmental impact.



Endnotes

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