

Capacity Building Workshop on Resilient Supply Chain

APEC Committee on Trade and Investment

October 2025



Asia-Pacific
Economic Cooperation



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Economic Cooperation**

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INTRODUCTION

On 13 August 2025, the Capacity Building Workshop on Resilient Supply Chain, hosted by the Republic of Korea (ROK) and co-sponsored by Australia; Brunei Darussalam; Chile; China, Malaysia; New Zealand; Papua New Guinea; Peru; Singapore; Chinese Taipei; Viet Nam, was held at the Songdo ConvensiA, ROK. The workshop brought together speakers and participants from APEC member economies, academia, international organizations, and the private sector to share experiences on how digital tools can enhance supply chain resilience, and explore how Free Trade Agreements (FTAs) and Regional Trade Agreements (RTAs) are incorporating resilient supply chains within the APEC region.

OPENING REMARKS

Korea's APEC Senior Official, Deputy Director-General Jiyeon Lee from ROK's Ministry of Foreign Affairs (MOFA), welcomed participants to Incheon and expressed Korea's honor in hosting the workshop as part of the fourth phase of the Capacity Building Needs Initiative (CBNI), launched in 2012 with the support of APEC member economies.

She noted that global supply chains, long built for efficiency, must now also be resilient in light of recent disruptions such as geopolitical tensions, trade disputes, and the pandemic. Given that APEC member economies account for over 60 percent of global GDP and over 50 percent of global trade, she highlighted their unique responsibility to lead efforts in strengthening supply chain resilience. She also noted Korea's role as the APEC 2025 host economy, with "Connect" identified as one of its priorities.

She explained that the workshop would focus on two key areas: first, the use of digital technologies—including artificial intelligence (AI)-driven logistics, blockchain, and cloud computing—to improve visibility, forecasting, and early risk detection; and second, integrating supply chain provisions in FTAs and RTAs, while recognizing persistent challenges such as complex rules of origin and compliance burdens on micro, small, and medium-sized enterprises (MSMEs).

In closing, she expressed hope that the workshop would provide valuable insights and practical tools for all member economies, and encouraged participants to exchange ideas and best practices to build more resilient and sustainable supply chains.

Session 1. Navigating Global Supply Chain Transitions

I. Global Supply Chain Reconfiguration: Implications for APEC

- Mr. Ed BRZYTWA, Vice President of International Trade for the Consumer Technology Association

Mr. Ed BRZYTWA has served as Director of APEC Affairs at the Office of the United States Trade Representative (USTR), engaging in the Indonesia (2012); China (2014); and the Philippines (2015). He was deeply involved in efforts to establish the APEC Alliance for Supply Chain Connectivity.

1. Background

Mr. Ed BRZYTWA began his presentation by explaining the current backdrop of global trade disruptions. He noted that the biggest challenges to supply chains today are policy-driven, particularly through tariffs and trade restrictions.

He highlighted that many APEC member economies had joined the World Trade Organization (WTO) Information Technology Agreement (ITA), which successfully eliminated tariffs on a wide range of technology products in 1997 and expanded coverage further in 2015. This agreement had long supported free and open trade in the Asia-Pacific region. However, he underscored that the “zero-in, zero-out” approach is now being disrupted by new tariff policies.

2. Key Issues and Discussions

Mr. Ed BRZYTWA’s presentation was structured into four key sections, providing a comprehensive overview of the reconfiguration of APEC’s global supply chains.

1) Current Trade Policy Disruptions

The current United States administration is pursuing comprehensive reshoring, with the policy emphasis that production should occur domestically in the United States, including components. Multiple tariff mechanisms were issued under Section 232 of the Trade Expansion Act of 1962. Potentially, tariffs of up to 100 percent on semiconductors and semiconductor content in downstream products are possible, with video game consoles could face potential tariffs of up to 145 percent (69 percent price increase), because they are not exempt from tariffs on imports from China.

2) Supply Chain Realities vs. Political Expectations

According to the Consumer Technology Association (CTA)–Kearney study, relocating all consumer tech production to the United States would require a USD500 billion investment over 10 years, 10 times increase in the United States workforce, a scenario unrealistic under current full-employment conditions. It would require massive investments in infrastructure, energy, training, and facility development that cannot be achieved overnight. The tariffs on inputs make manufacturing more complex and costly, not easier.

3) Impact on the Innovation Ecosystem

Small businesses and startups are disproportionately affected as they lack the resources of large multinational firms to handle compliance costs and uncertainty. In addition, tariff uncertainty creates a “chilling effect” on innovation, prompting companies to retain cash reserves instead of investing. Multiple layers of “tariff stacking” create unpredictable cost structures and the compliance costs are

as disruptive as the tariffs themselves, particularly for micro, small and medium-sized enterprises (MSMEs).

4) Consumer and Market Impact

Tariffs are typically borne by the consumers, not foreign economies, and they are contributing to higher prices. The Core Consumer Price Index (CPI) has shown upward movement correlating with tariff implementation, and this may lead the Federal Reserve to maintain higher interest rates rather than reducing them. Some products may be withdrawn from the United States market due to prohibitive costs or result in product delays and feature reductions to avoid higher tariff classifications.

3. Policy Recommendations for the APEC Region

While specific recommendations were noted in the final section of the presentation, the preceding discussion implicitly pointed toward several key policy areas.

- **Minimize Trade Frictions:** Work is needed to minimize trade restrictions across the region despite consensus-based challenges, and APEC's confidential meeting format should be used to encourage frank discussions about trade tensions, in addition to focusing on maintaining the rules-based trading system that has benefited the Asia-Pacific region.
- **Emphasize Affordability and Digital Inclusion:** Priority should be given to keeping technology affordable for average consumers across the region; and steps should be taken to avoid deepening digital divides through trade barriers, while continuing APEC's decades-long focus on digital accessibility.
- **Best Practice Sharing:** Public and private sector best practices should be shared for handling supply chain disruptions; and focus should be given to how companies diversify supply chains and choose multiple production facilities for risk mitigation, while creating transparency around economy-wide programs promoting economic security and supply chain resilience through facilitating dialogue between economies with different economic security approaches.
- **Promote Resilience through Cooperation, Not Mercantilism:** Imports, not just exports, should be framed as positive and beneficial; imports and exports should be recognized as "two sides of the same coin;" and support should be directed toward supply chain diversification through multilateral cooperation rather than unilateral restrictions.
- **Focus on Workforce Development:** Efforts should be made to address how to create better workforces for evolving supply chains, focusing on training for AI and new technologies in supply chain management, while preparing for constantly changing supply chain requirements.
- **Support MSMEs:** It should be recognized that MSMEs cannot handle tariff uncertainty and compliance costs like large multinationals, and specific support mechanisms should be developed for startups and small businesses affected by trade disruptions. This is in alignment with maintaining focus on APEC's long-standing support for MSMEs.

II. Private Sector Strategies for Enhancing Supply Chain Resilience

- Dr. Wonho YEON, Head of Global Economic Security Group, Hyundai Motor Group

Dr. Wonho YEON is the Head of Global Economic Security Group at Hyundai Motor Group. Previously, he served as Director and Professor of the Center for Economic and Technology Security Studies at the Korea National Diplomatic Academy (KNDA) and as Head of Economic Security Team at the Korea Institute for International Economic Policy (KIEP).

1. Background

Dr. Wonho YEON began his presentation by explaining how global supply chains are undergoing a paradigm shift from efficiency to stability. In the Global Value Chains Expansion Era (1990s-2000s), Information and Communications Technology (ICT) advances reduced coordination costs, the end of the Cold War integrated China/Russia's cheap labor, FTAs reduced barriers, and mega markets (EU integration, China's WTO entry) emerged, creating scale efficiencies and fueling globalism.

However, in the post-2008 period, the global financial crisis slowed demand, slower growth in Europe/China weakened trade, the United States shale boom reduced crude imports, and stalled trade negotiations removed new globalization catalysts. This led to paradigm shifts post-2020, where geopolitical rivalry and the pandemic exposed supply chain vulnerabilities, leading to the rise of "economic security," focusing on advanced technologies, supply chains, and digital domains. While global value chains (GVCs) focused on value capture, they now focus on end-to-end flow and delivery continuity. The shift represents moving from efficiency-driven to stability-driven supply chain management.

2. Key Issues and Discussions

Dr. Wonho YEON discussed increased disruption frequencies of supply chains, macro-driven economic impact factors, and corporate lessons learned.

1) Increased Frequency of Supply Chains Disruptions

Supply chain disruptions are now classified into four categories: (1) routine business challenges (predictable/low-impact); (2) manageable surprises (unpredictable/moderate impact); (3) brewing storms (predictable/high-impact like geopolitics); and (4) black swans (unpredictable/extreme impact like pandemics). This demonstrates that even well-prepared firms face systemic risks beyond their control. At the same time, natural disasters, particularly floods and extreme weather, are increasing annually. In addition, the United States-China strategic decoupling is creating dual pressures on global supply networks.

2) Macro-driven Economic Impact

KPMG's supply chain stress index correlates strongly with inflation rates in both the United States and the Republic of Korea. In addition, recent inflation is primarily supply-driven, not demand-driven. At the same time, industrial policies from major economies are creating "extraordinarily great uncertainty," leading to supply chain instability.

3) Corporate Lessons Learned

From these issues, four key lessons emerged: 1) Reduce overdependence through emphasizing diversification; 2) Place trust at the center of supply chain restructuring; 3) Elevate the role of

governance in supply chain decisions; and 4) Work in smaller coalitions rather than through broad multilateral approaches.

3. Policy Recommendations for the APEC Region

To accelerate the transition toward sustainable and resilient supply chains, APEC economies may consider focusing on the following policy recommendations:

- **Diversification and Regionalization Strategies:** Explicit concentration limits should be implemented (e.g., a maximum of 50 percent for critical parts from single suppliers); regional manufacturing clusters near major demand centers should be built; products for flexibility should be engineered through approved alternatives and common specifications; and "best cost" rather than "lowest cost" strategies should be pursued.
- **Develop Trust and Transparency Framework:** Supplier trust frameworks should be developed covering environmental, social, and governance (ESG); sanctions screening, IP protection, cybersecurity, and secure data sharing through long-term contracts and co-investments should be facilitated; and traceability systems and digital product passports for supply chain verification should be adopted.
- **Compete on Best Cost:** Dedicated teams should be set up to secure public grants and tax credits; policy incentives should be factored into sourcing decisions alongside traditional cost consideration; and risk-adjusted total costs including tariffs, foreign exchange, carbon emissions, and expected disruptions should be taken into account.
- **Institutional Scenario-Based War Gaming and Agile Governance:** AI-driven digital twins should be utilized for end-to-end network monitoring and stress testing; scenario-based war gaming should be implemented to translate signals into rapid response actions; and agile governance structures should be formed that make resilience "a repeatable muscle, not a one-off project."

Given APEC's role representing 60 percent of global gross domestic product (GDP) and 50 percent of global trade, the region could lead in developing frameworks that balance efficiency with resilience, facilitate smaller coalition-based cooperation, and help member economies transition from market-only to market-plus-policy decision-making in supply chain design.

Session 2. Sharing Best Practices on Supply Chain Resilience

I. A Korean Approach to Supply Chain Resilience: Policy Measures and the Role of CESFA

- Dr. Jaewon LEE, Senior Specialist, ROK's MOFA Center for Economic Security and Foreign Affairs.

Dr. Jaewon LEE is the Senior Specialist at the Center for Economic Security and Foreign Affairs (CESFA). His research interests include the United States–China strategic competition, economic security, sanctions and export controls.

1. Background

Dr. Jaewon LEE's presentation began by noting Korea, an export-oriented economy with a 90 percent trade-to-GDP ratio, but facing economic vulnerabilities. Korea has a high dependence on imports of critical items, creating structural vulnerabilities, such as the semiconductor industry case study which reveals deep dependencies, including on software (United States; United Kingdom), manufacturing equipment (Netherlands; Japan; United States), and key materials (Germany; Japan; United States).

Korea faced severe logistics disruption due to a shortage of urea water solution, which depended on imports from China. This created a nationwide crisis resulting in long lines at gas stations and near-paralysis of logistics networks. This served as a decisive catalyst for ROK's MOFA Center for Economic Security and Foreign Affairs (CESFA) to be established shortly after. It operates under MOFA and is part of the broader economic security governance architecture under the ROK National Security Council.

2. Key Issues and Discussions

Dr. Lee's presentation elaborated on the role of CESFA, and its contributions to Korea's economic security and supply chains as well as the issues involved.

1) Definitional and Conceptual Challenges

Economic security remains a vague concept without established definitions. The core values identified are survival, security, autonomy, prosperity, and welfare. In this context, supply chain resilience is viewed as a response to disruption risks within the broader economic security framework.

2) Complex Risk Environment

Traditional geopolitical risks are now combined with new elements, such as emerging technologies, dual-use technology, cyberattacks, pandemics, climate change, natural disasters, and transportation bottlenecks. This demonstrates a convergent environment where economics, security, and technology intertwine, and requires a multifaceted, comprehensive response approach.

3) Early-Warning System Challenges

Korea monitors approximately 300 economic security items across three tiers. Tier-1 criteria entail items that have high foreign dependency, are difficult to substitute, and are of high importance to the Korean economy.

4) Governance Complexity

There are multiple overlapping jurisdictions across ministries, and the legal framework spans multiple acts and basic plans with three-year update cycles. This complex system requires better coordination among agricultural products (Ministry of Agriculture, Food and Rural Affairs), industrial items (Ministry of Trade, Industry and Energy), foreign affairs intelligence (Ministry of Foreign Affairs).

3. Policy Recommendations for the APEC Region

Based on Korea's case study for economic security, the following policy recommendations are crucial for APEC economies to foster sustainable supply chains:

- **Comprehensive Legal and Institutional Framework:** Legally grounded basic plans should be established with regular update mechanisms, similar to how Korea uses three-year cycles; and specialized institutions should be created for economic security monitoring and analysis, while developing integrated early-warning systems across public agencies to eliminate information silos.
- **Four-Pillar Approach to Supply Chain Resilience:** Stable supply management should be ensured by designating critical items for monitoring with early-warning systems; resilience should be strengthened by implementing stockpiling, domestic production bolstering, and import source diversification; a global position should be established by maintaining and strengthening global collaboration networks; and crisis response capabilities should be built by developing crisis management manuals and cross-checking procedures.
- **Information Sharing and Intelligence Network:** Diplomatic missions should be strengthened as platforms for real-time intelligence gathering on host economies' policies, laws, and industrial trends; regular information sharing should be encouraged between the public and private sector; regular analytical reports (Korea's bi-weekly reviews) should be published to inform stakeholders; and integrated information systems should be created for connecting multiple public agencies.
- **Practical Implementation Tools:** Regular tabletop exercises should be conducted to test crisis response capabilities, risk monitoring manuals should be developed for public officials; and cross-checking procedures should be implemented to avoid both overestimation and underestimation of crises, while establishing direct communication channels with private sector points of contact.
- **Balance Protection with Prosperity:** Economic security should be framed not just as protection but as an enabler of prosperity; and commitment to global collaboration should be sustained while enhancing domestic capabilities. This also entails avoiding isolationist approaches that could undermine the interconnectedness of the global economy. Strengthening domestic capabilities while simultaneously deepening international partnerships is the key.
- **APEC-Specific Applications:** Resilience cannot be achieved in isolation given the Asia-Pacific region's interconnectedness; region-wide mechanisms for early-warning sharing should be developed; and standardized approaches to critical item identification and monitoring should be created, in addition to establishing best practice sharing for crisis response and supply chain diversification strategies.

II. Strengthening Supply Chain Resilience: Malaysia's Industrial Policies and Best Practices

- Dr. Sithra Devi VELLASAMY, Senior Principal Assistant Director, Ministry of Investment, Trade and Industry of Malaysia

Dr. Sithra Devi VELLASAMY is an officer at the Ministry of Investment, Trade, and Industry (MITI), Malaysia, specializing in supply chain and business continuity. She has contributed to initiatives such as the Indo-Pacific Economic Framework (IPEF) Supply Chain Agreement and the ASEAN-China Free Trade Area (ACFTA) Supply Chain Connectivity Chapter.

1. Background

Dr. Sithra Devi VELLASAMY began her presentation with how Malaysia plays a significant role in global semiconductor supply chains, contributing 13 percent of global Outsourced Semiconductor Assembly and Test (OSAT) activities. The Malaysian economy is deeply integrated into global value chains, particularly in high-value industries like semiconductors, while 70 percent of Malaysia's industry players are MSMEs. For nearly five decades, Malaysia has specialized in OSAT activities in semiconductor manufacturing.

2. Key Issues and Discussions

The presentation elaborated on three main points, including domestic structural challenges, supply chain interdependency complexity, and economic security framework gaps.

1) Structural Challenges

The high import dependency is particularly problematic for single-source items where Malaysia depends entirely on one economy for critical supplies. In addition, fragmented data systems, with data scattered across industries, public agencies, and stakeholders, are obstacles to data-driven supply chain strengthening. The siloed working culture - in which the cross-cutting nature of supply chains conflicts with compartmentalized public structure where agencies focus only on specific areas -along with limited MSME capacity due to small businesses being unable to afford international business matching and networking opportunities, are domestic challenges that Malaysia faces.

2) Supply Chain Interdependency Complexity

The microchip shortage example demonstrated how supply chains were interdependent, affecting automotive production, which then affected downstream industries such as food production (e.g., gummy bears). This showed how supply chains are intensively networked and interconnected beyond single industry boundaries, and traditional "tunnel vision" approaches are inadequate for addressing complex interdependencies.

3) Economic Security Framework Gaps

Economic security is acknowledged as an important concept but lacks clear multilateral, bilateral, or domestic definition. There is a need for a structured approach balancing self-sufficiency with global integration. In addition, there is a recognition that commercial considerations may lead companies back to single-sourcing despite public calls for diversification.

3. Policy Recommendations for the APEC Region

Based on the insights presented, the following policy recommendations are proposed for APEC economies to foster resilient supply chains.

- **Comprehensive Industrial Policy Framework:** APEC member economies can develop integrated approaches like Malaysia's New Industrial Master Plan 2030 with specific missions for supply chain resilience, and create sector-specific roadmaps that advance positioning in global value chains. This approach leverages moving beyond traditional roles to higher-value activities, such as Malaysia advancing from OSAT to front-end fabrication and advanced packaging.
- **Digital Integration and Data Systems:** Integrated digital platforms should be established with Supply Chain Intelligent Management Systems to integrate data from multiple agencies and international sources for analytics. Business Continuity Applications would provide real-time risk alerts and verified information to industry players and Virtual Centers of Excellence should enable MSME participation in global value chains through digital networking and knowledge sharing.
- **Multilateral Cooperation and Trade Integration:** APEC member economies could explore actively engaging in multiple FTA frameworks, like how Malaysia participates in 16 FTAs: 9 regional, 7 bilateral in addition to participation in supply chain-focused frameworks like the Indo-Pacific Economic Framework (IPEF), Association of Southeast Asian Nations (ASEAN)-China FTA, Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), Regional Comprehensive Economic Partnership (RCEP), and use multilateral platforms like APEC to facilitate linkages that achieve economies of scale across member economies. Developing Supply Chain Due Diligence terms of reference through bilateral cooperation is also recommended.
- **Capacity Building and Localization Programs:** Vendor development programs which are joint initiatives between multinational corporations (MNCs) and large local corporations to upgrade local suppliers, particularly MSMEs, or industry linkage programs that integrate domestic companies with global supply chains through targeted overseas missions for specific sectors are recommended. Local sourcing initiatives such as promoting localization, while recognizing economies of scale limitations that require multilateral coordination, are also recommended.
- **Prevention, Readiness, and Recovery Framework:** A proactive three-stage approach should be adopted, including prevention where possible, readiness for potential disruptions, and preparation for recovery while recognizing that complete prevention is impossible, requiring robust response and recovery capabilities. Therefore, economies can implement awareness and outreach programs through webinars, seminars, and conferences.
- **APEC-Specific Applications:** Moving beyond single-industry focus to understand complex interdependencies across sectors is needed. Region-wide mechanisms should be developed to include small businesses in global value chains, in addition to using APEC's multilateral platform to help smaller economies achieve scale through collective sourcing and production, while establishing common frameworks for supply chain data sharing and analytics, and balancing commercial considerations with strategic diversification needs through coordinated policy approaches are recommended.

III. Building Resilient Supply Chains: Insights from ABAC

- **Mr. Benjamin TAN, Director of International Relations, Singapore Business Foundation, ABAC Singapore**

Mr. Benjamin TAN is the Director at the Centre for the Future of Trade and Investment (CFOTI) at the Singapore Business Federation (SBF). In this role, he also serves as the secretariat lead for APEC Business Advisory Council (ABAC) Singapore. Prior to joining SBF, Benjamin was Program Director at the APEC Secretariat, overseeing the Committee on Trade and Investment and ABAC-

1. Background

Mr. Benjamin TAN began his presentation with ABAC, or the APEC Business Advisory Council, which represents business perspectives across 21 APEC member economies. The project evolved from a concept note to full implementation, demonstrating APEC's commitment to supply chain resilience. ABAC addresses vast differences in economic development, infrastructure, and digital readiness within the APEC region.

The COVID-19 pandemic created unprecedented supply-demand shocks, with trade tensions between major economies leading to sudden tariff hikes and supply shifts. These geo-economic events reshaping entire trade patterns, with natural disasters and climate change threatening logistics and production resulted in delays, rising costs, shortages, and erosion of confidence in just-in-time models. Escalating trade tensions have strong implications for jobs, business confidence, and economic recovery. These are no longer isolated events, but structural risks requiring both efficiency and resilience.

2. Key Issues and Discussions

The presentation elaborated on three main points, including policy and regulatory challenges, vulnerabilities of MSMEs, and structural weaknesses in current systems.

1) Policy and Regulatory Challenges

Policy shifts have introduced greater uncertainty for business planning and investments. Therefore, domestic regulatory clarity alongside international trade rules is required, for predictability at both the global and local levels. Sudden export restrictions, opaque customs procedures, and conflicting standards have weakened supply chain confidence.

2) MSME Vulnerabilities

MSMEs comprise 90 percent of all businesses in APEC economies and contribute significantly to employment and GDP. However, they are disproportionately vulnerable due to size constraints, a lack of diversified suppliers, an absence of buffer inventory, and a lack of digital tools for real-time visibility. Therefore, when shocks hit, MSMEs are the most immediately and severely affected.

3) Structural Weaknesses in Current Systems

Just-in-time models are proving inadequate in the current risk environment. However, limited access to finance tools reflects the realities that MSMEs face, beyond credit ratings or collateral. Bureaucratic barriers locking small players out of digital trade systems, or inadequate shared logistics services for

last-mile and cross-border shipping are evidence of insufficient MSME representation in customs reform and regulatory design.

3. Policy Recommendations for the APEC Region

Based on the insights presented, the following policy recommendations are proposed as crucial for APEC economies to foster resilient supply chains.

- **Multi-Dimensional Resilience Framework:** (1) Flexibility: Ability to quickly switch suppliers, modify products, and reach alternative customers/markets; (2) Visibility: Digital tools for tracking shipments, integrated e-payments, and customs procedures; (3) Connectivity: Reliable transportation access, optimized warehousing, last-mile delivery, and automation adoption; (4) Robustness: Risk strategies, cybersecurity measures, adequate finance access, and risk transfer mechanisms; and (5) Redundancy: Reserve inventory, extra production capacity, and financial reserves for shock absorption.
- **MSME-Focused Support Systems:** Finance tools should be designed reflecting MSME limitations. Simplified digital trade documentation is required to prevent bureaucratic exclusion, shared logistics services should be created to make cross-border shipping more affordable, while embedding MSME perspectives in customs reform, digital identity, and regulatory design processes, as MSME empowerment creates more agile, inclusive, and innovative entire supply chains.
- **Digital Transformation Initiatives:** Support for paperless trade systems and e-invoicing implementation, with interoperable digital standards to help MSMEs integrate into global trade; blockchain should be utilized for documentation authentication and trust-building, while eliminating bottlenecks through digitalization of border processes; and digital tools should be accessible to non-specialists with clear language and sector examples.
- **APEC Supply Chain Connectivity Framework Implementation:** Support for the framework's pillars of Hard Infrastructure, Digitalization, Information Sharing, and Sustainability and Inclusion.
- **Public-Private Partnership Development:** Co-investment should be encouraged in infrastructure, especially in underserved regions, and policy certainty and long-term commitment should be provided to enable business participation; physical infrastructure remains critical even with digital advancement and digital platforms should balance addressing congested ports and highways.
- **Practical Implementation Tools:** Free, multilingual self-assessment tools should be deployed like ABAC's MSME Supply Chain Resilience Toolkit and confidential, user-controlled assessment platforms should be provided; sector-specific guidance should be offered for healthcare, food, consumer technology, and consumer goods; and actionable, benchmarked recommendations should be made for practical implementation.
- **Trade Environment Stability:** Commitment to free and open trade principles should be reaffirmed; WTO principles of non-discrimination and predictability should be upheld; sudden policy shifts should be addressed that disrupt specific supply chains and business planning while restoring confidence through consistent, transparent trade policies.

Session 3. Enhancing Supply Chain Visibility – Digital Tools

I. Digital Tools for Enhanced Supply Chain Governance - Customs, Bill of Lading, and Automatic Identification System Data

- Dr. Paul H. JUNG, Professor, Inha University

Dr. Paul H. JUNG is an Assistant Professor of Transport Geography at the Asia Pacific School of Logistics, Inha University. s research spans transport geography and GIScience, with a focus on transportation systems, global supply chains, international trade logistics, and urban-regional

1. Background

Dr. Paul JUNG began his presentation by noting that 85 percent of global trade is delivered through maritime transportation, with the seamless flow of trade along global supply chains being the backbone of a globalized economy. Advancements in international logistics systems have accelerated efficient border-crossing shipments and enabled a complex multimodal integration process involving containerization across land and water transport modes. This is now facing "dual challenges," creating divergence. Supply chain disruption events and sustainability pressures such as shipping sector carbon emissions have created the need to assess the full extent of disruption impacts on economies and trade activities.

2. Key Issues and Discussions

1) Limitations of Traditional Economic Analysis

The existing economy-to-economy analysis is unable to adequately address critical supply chain questions about disruption impacts, trade facilitation, or delivery efficiency. The classical economics perspective is insufficient for understanding physical material movements. Therefore, there needs to be a shift from an economic view to a "place-to-place perspective" that examines the micro-behavior of shipment routing.

2) Data Access and Technical Challenges

Limited access to micro-level disaggregated shipment data, which is not widely available to the public, also underscores the need for a comprehensive understanding across multiple domains: economics, international trade, transportation, logistics, and geography. Also, the data needs various analytical techniques: big data analysis, econometrics, geographic information science, and routing methods. Therefore, there are high technical barriers for data handling and analysis.

3) Complex Global Supply Chain Vulnerabilities

Multimodal integration creates multiple weak points along logistics chains, and any point could be threatened, compromising the stability of the entire chain. Examples include the United States-China trade disputes, COVID-19 port shutdowns, Suez Canal blockage, and the Red Sea crisis. The Panama Canal drought case study showed a 12 percent increase in voyage duration, a 35 percent increase in port-stopping duration, and a 10 percent reduction in average speed.

4) Spatial and Physical Dimensions

Trade shipments move from place to place with specific spatial characteristics, and global supply chain disruptions and sustainability issues cannot be understood merely as monetary exchange. They

must be understood as physical features of material flow along trade routes, such as the hinterland-foreland continuum, which is the integration of inland areas behind ports with sea areas in front of ports.

3. Policy Recommendations for the APEC Region

- **Data Infrastructure Development:** Comprehensive government data infrastructure should be built utilizing the Automatic Identification System (AIS) vessel trajectory data and bills of lading data; capabilities should be developed to track real-time vessel movements and detailed shipment information; and systems should be created to monitor origin points, port of discharge, port of export, arrival ports, and final destinations, while establishing micro-level shipment tracking across the five focal points of trade.
- **Physical Trade Focus and Coordination:** Policy attention should be refocused on the physical/transportation side of trade beyond traditional tariff and industrial output considerations and trade should be treated as a transportation phenomenon, monitoring how physical movements change over time; disruption responses should be coordinated between economies through shared understanding of physical trade flows, and cross-border cooperation should be enhanced to address transportation bottlenecks and inefficiencies.
- **Early-Warning and Information Sharing Systems:** Data sharing mechanisms should be created between APEC economies for early-warning system development; physical cargo movements should be tracked across economies to strengthen supply chain resilience; real-time monitoring of critical chokepoints should be established and information should be shared on port congestion, route disruptions, and alternative paths.
- **Alternative Routing and Resilience Strategies:** Comprehensive alternative routing strategies should be developed for critical trade corridors, while creating visualization tools for physical flow of trade shipments to enable quick response to unexpected events; hub port dependencies should be mapped (e.g., European case showing Balkan economies depending on Italian ports and Eastern Europe depending on German ports), and backup routes should be identified and prepared for critical supply chain links.
- **Carbon Emission Monitoring and Decarbonization:** Vessel speeds and locations should be tracked to identify carbon emission hotspots; decarbonization policies should be focused on locations where emissions drastically increase and implement speed restrictions at identified high-emission points; and targeted policies should be developed for sustainable shipping practices based on real movement data.
- **Capacity Building for Data Analytics:** Regional capacity should be built for big data analysis using Python, R, and generative AI tools; experts should be trained in transportation geography, logistics analytics, and supply chain visualization; user-friendly tools should be developed for policymakers to understand complex shipping patterns; and standardized analytical frameworks should be created for cross-economy comparison and coordination.
- **Targeted Response Mechanisms:** Data fusion of customs and AIS data for shipment-level visibility should be used; precise and timely governance responses to disruptions should be supported, while focusing on checkpoints, carbon emission hotspots, and cross-border routing changes; and targeted responses should be developed based on empirical evidence rather than general assumptions.

II. Data-Driven Logistics

- Mr. Dongkyun KIM, Vice President, Samsung SDS

With extensive expertise in consumer electronics, technology, and logistics, Mr. Dongkyun KIM is recognized for his strategic vision and results-oriented leadership. Proficient in building and scaling high-performing global teams, he excels in managing intricate supply chains and leveraging technology to achieve optimal business outcomes.

1. Background

Mr. Dongkyun KIM observed that most still view logistics as a conventional and labor-intensive operation, with multiple Southeast Asian companies still questioning the need for systems and data in warehouse operations. Samsung operates its own logistics systems and opens system layers to customers until they develop their own capabilities. Traditional operations rely heavily on manual processes, paper-based planning, and visual searching, and the lack of proper warehouse management systems creates fundamental operational vulnerabilities.

Global e-commerce transaction volume has accelerated significantly since 2015, reaching USD8.6 trillion, and supply chain complexity and risks are increasing exponentially. New technology implementation frequency has also increased since 2015, creating competitive pressure.

2. Key Issues and Discussions

1) Critical Operational Risks from Data-Poor Systems

Inventory discrepancies, where system data does not match the actual inventory, may result in incorrect purchase orders and shortages. Without system data, managing first-in, first-out (FIFO) for hundreds of thousands of items becomes impossible, leading to expired products being shipped to customers. Aging control issues, where companies are unable to control product aging, can result in quality degradation and brand damage.

2) Conventional Operations Case Study Problems

With poor data systems, workers are forced to carry multiple labels, products, and instruction papers while visually searching for locations. Operation plans are written on whiteboards without systematic tracking. This results in the inability to maximize sales capacity due to operational instability, and as well as high labor costs from slow processing speeds. These errors erode business trust within supply chains and heavy reliance on third-party workers creates operational hiccups.

3) In Transit Inventory Visibility Gap

Companies typically have only 50 percent visibility into their total inventory when operations are warehouse-based. The remaining 50 percent is in transit on vessels (a four-week shipping time to the United States/Europe). Therefore, there are limited supply chain response capabilities during disruptions, and complex global coordination requires multiple phone calls, document analysis, and schedule tracking.

4) Global Shipping Complexity Challenges

It is difficult to calculate daily arrivals manually across multiple systems through Delivery Schedule Management. Penalty risks from complex contracts and conditions create heavy penalty exposure

without systematic monitoring. Demurrage or detention issues for managing 1,000+ containers monthly with different carrier conditions and changing terms are all challenges faced by global shipping.

3. Policy Recommendations for the APEC Region

- **System Infrastructure Development Framework:** Good foundational systems should be established before implementing advanced technologies, and self-improvement loops should be created; data analysis modules and Power BI capabilities should be built on solid system foundations; and regional capacity building programs should be developed to help companies transition from manual to system-based operations.
- **Customized Digital Solutions Approach:** The development of customized tools should be supported to address specific visibility problems rather than one-size-fits-all solutions, and a collaborative dashboard design should be encouraged where companies can specify exact requirements; rapid deployment models should be promoted and the focus should be on solutions that integrate immediately into existing operations.
- **Comprehensive Supply Chain Visibility:** Both warehouse-based and in-transit inventory visibility gaps could be addressed, and regional standards for supply chain data sharing and tracking should be developed; and integrated platforms should be created showing container movements, inventory flows, and shipment details, while implementing early-warning systems for delays and disruptions across the supply chain.
- **Risk Management and Technology Adoption:** Digitalization should be framed as a risk management strategy rather than an optional efficiency improvement; companies should be supported to avoid a "driving without visibility" approach to logistics by promoting an understanding that data-driven logistics can minimize both risk magnitude and duration; and a proactive rather than reactive approach should be encouraged to supply chain management.
- **Regional Capacity Building Programs:** Networks should be optimized to support optimal warehouse location identification to minimize transportation costs; a 3D DC Design could be developed to promote practical solutions for optimal equipment placement and movement paths, with Standard Operating Procedures (SOPs) to develop and optimize customized SOPs based on systematic approaches; and automation processing equipment should be implemented based on solid system foundations.
- **Measurable Impact Targets:** Benchmarks should be established for 2.5× productivity improvement within 8-12 weeks of system implementation, 60-70 percent reduction in inventory aging within 4-6 months, immediate bottleneck sensing and response capabilities, and significant reduction in picking errors and operational hiccups.
- **Competitive Positioning Strategy:** It should be recognized that companies without data-driven logistics capabilities risk falling behind the competition, and support should be given for technology adoption that enables competitive supply chain capabilities; exponentially increasing supply chain complexity should be addressed through systematic approaches; and regional collaboration should be promoted in technology development and best practice sharing.

- **Public-Private Partnership Development:** Established companies (like Samsung) should be encouraged to share system capabilities with smaller regional players, and support should be given for temporary system sharing arrangements while companies develop internal capabilities; and regional innovation hubs should be created for logistics technology development and deployment, establishing mentorship programs pairing technology-advanced companies with traditional operators.

III. Regulations and Digital Tools for Supply Chains

- **Dr. Witada ANUKOONWATTAKA, Economic Affairs Officer of Trade, Investment and Innovation Division, United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)**

Dr. Witada ANUKOONWATTAKA is an Economic Affairs Officer in the Trade Policy and Facilitation Section of the Trade and Investment Division (TIID) at the United Nations ESCAP. She leads TIID's research projects and capacity-building activities on key trade issues, including digital trade, global value chains, regional integration, and the relationship between trade and the Sustainable Development Goals (SDGs). Currently, she heads projects under the ESCAP-ECLAC-ECA joint initiative on digital trade regulatory integration.

1. Background

Dr. Witada ANUKOONWATTAKA began her presentation by noting that UNESCAP encompasses the Asia-Pacific with 53 members (broader than APEC's 21 economies), and functions similarly to the APEC Secretariat but with more diverse economies. It has two primary goals: to promote regional cooperation and advance the Sustainable Development Goals (SDGs), focusing on aligning inclusivity, sustainability, and economic development.

The scope of trade policy has expanded beyond traditional tariffs, standards, and rules of origin, and now encompasses digital governance rules affecting cross-border data flows, services, and intangible goods. Digital tools require supportive regulatory environments, not just technology investment, and the role of economies is crucial in providing a regulatory landscape enabling access and affordability.

2. Key Issues and Discussions:

1) Data Flow Policies, E-Customs and Trade Facilitation, and Digital Identity and Authentication

Data Flow Policies are data localization requirements, privacy regulations, and cybersecurity mandates affecting AI, advanced analytics, real-time cross-border tracking, Internet of Things (IoT), cloud-based enterprise resource planning (ERP) systems, and have varying data retention periods, data protection impact assessments, and public access requirements across economies, creating additional compliance costs and complexity for firms.

E-Customs and Trade Facilitation refer to rules for expediting cross-border movement of parts, components, goods, services, with e-customs, single windows, e-certificates of origin, and e-invoicing systems. This affects logistics management, automated warehouses, and digital documentation transfers, with less than 50 percent of cross-border paperless trade has been implemented in the Asia-Pacific as of 2024.

Digital Identity and Authentication are legal frameworks for e-signatures, e-contracts, and digital identity verification, which are essential for blockchain, smart contracts, and supplier collaboration

platforms. They require mutual recognition with trading partners, and are critical for building trust and securing transactions.

2) Data Sensitivity Classification Challenge

Three data categories with different regulatory requirements are **Low Sensitivity**: Operational data with minimal transfer restrictions, **Moderate Sensitivity**: Commercial/financial data requiring secure transfer protocols, and **High Sensitivity**: Personal data subject to strict privacy protections.

3) MSME Disadvantage in Regulatory Navigation

Large firms can manage complex regulatory compliance costs, but MSMEs face significant disadvantages requiring specialized data management knowledge. They require understanding of exemptions, categorization, approved transfer mechanisms, and free trade zone opportunities. However, this complexity creates barriers to MSME participation in digital supply chains.

4) Trade Agreement Complexity

Increasing incorporation of digital rules in trade agreements since the 2010s, and multiple overlapping agreements with different digital commitments, have made it difficult for economies to monitor and coordinate various digital provisions, creating a "trade agreement maze" for businesses to navigate.

3. Policy Recommendations for the APEC Region

- **Prioritize Risk-Based Data Governance Approach:** "One-size-fits-all" data regulations should be avoided across all data types, and rules should be tailored to data sensitivity levels rather than blanket restrictions. Low-sensitivity operational data regulations should avoid constraining supply chain efficiency, and secure transfer protocols should be implemented for commercial and financial data.
- **MSME-Targeted Support Systems:** Specialized assistance should be provided to help SMEs understand and interpret complex digital trade rules, and information services should be offered explaining regulatory requirements across different economies; and MSME access to approved data transfer mechanisms and free trade zone opportunities should be promoted by developing simplified compliance frameworks.
- **Integrate Regional Regulatory Harmonization:** An APEC platform should be used for dialogue and cooperation on digital trade regulations, and regulations should be simplified and coordinated across member economies; and mutual recognition frameworks should be developed for digital identity and authentication systems, and regional standards should be established for secure data transfer protocols.
- **Cross-Border Digital Infrastructure Development:** Single window system implementation should be accelerated across all APEC economies, and mutual agreements should be developed for electronic data exchange between systems; and legal frameworks should be established for cross-border paperless trade, and interoperable digital systems should be created to reduce compliance burdens.
- **Foster Collaborative Tool Development:** Regulatory transparency mechanisms should be established similar to ESCAP's RDTI dashboard, and searchable databases of digital trade

regulations should be created across APEC economies, while building collaborative partnerships.

- **Trade Agreement Coordination:** Digital provisions should be monitored and coordinated across multiple trade agreements, and text-search capabilities should be established for digital trade commitments; and complexity and contradictions should be reduced between different agreement frameworks while providing guidance for businesses navigating multiple digital trade agreements
- **Support Capacity Building Programs:** Specialized training should be developed for public officials on digital trade policy, while supporting economies lacking resources for comprehensive digital trade infrastructure; best practices should be shared from advanced economies, like Korea's intelligence systems; and technical expertise should be built in cybersecurity and secure transfer protocols.
- **Facilitate Public-Private Partnership Framework:** Efforts should be made to engage the private sector in regulatory design processes, and business perspectives should inform digital trade policy development; and feedback mechanisms should be created for assessing regulatory impact on supply chain operations, while supporting industry-government collaboration on digital standards development.

Session 4. FTAs, RTAs and Supply Chains – What’s Missing and What’s Needed

I. ASEAN’s Integration of Supply Chains in Trade Agreements

- Dr. Wannaphong DURONGKAVEROJ, Professor, Ramkhamhaeng University

Dr. Wannaphong DURONGKAVEROJ is an Associate Professor of Economics at Ramkhamhaeng University Bangkok, Thailand. He is also a visiting fellow at ISEAS – Yusof Ishak, Singapore. He obtained a PhD in economics from the Australian National University. His research interest covers structural transformation, international trade, poverty, and inequality.

1. Background

Dr. Wannaphong DURONGKAVEROJ focused on ‘Global Production Sharing’, the cross-border dispersion of manufacturing activities, where multiple economies share the production of single products, which has become a key feature of the global economy, particularly in Asia. Also known as value chain fragmentation, specialization, and offshoring is built inter-firm relationships within manufacturing value chains. Examples include Thailand’s solid-state drive (SSD) production network - exporting significant quantities while importing components from Malaysia; Chinese Taipei; United States; Viet Nam. Each bicycle component is manufactured in different European and Asian economies, and final assembly in Viet Nam. This demonstrates how economies add small incremental value rather than the complete domestic production.

With a dramatic shift over the past half-century, manufacturing exports moved from developed to developing economies in the early 1960s; 70-80 percent of manufacturing products were exported from developed economies; currently, 60 percent of manufacturing products are exported from developing economies. Asian economies have shown a rising share in world manufacturing exports from the late 1980s to 2017.

2. Key Issues and Discussions:

1) Four Key Global Manufacturing Value Chain (GMVC) Determinants

Relative labor costs, labor market conditions affecting how easily manufacturing firms can hire workers and access skilled human capital, service link costs related to how open an economy’s trade and investment regime is, and proactive foreign direct investment promotion policies. Notably, FTAs do not appear as a primary determinant in this framework. Asian economies engage in GMVC activities at different stages of development, with economies like Thailand initially focusing on assembly activities due to abundant labor and lower human capital levels in the early 2000s, then transitioning to parts and components production as inter-firm relationships strengthened.

2) FTA Limitations and Disruptions

The rise of GMVC actually strengthens the case for multilateral or WTO-based approaches rather than regional or bilateral FTAs because production networks often involve both FTA and non-FTA partner economies. FTAs may disrupt existing GMVC phenomena because structuring supply chains requires consideration of rules of origin and bilateral deals, which constrains companies from optimizing production globally. Since global value chains are built on inter-firm relationships that cannot be established quickly, new FTAs may disrupt already established production networks that took years to develop.

3) Rules of Origin Complications

Rules of origin pose particularly challenging issues for GMVC operations because trade effects of FTAs depend largely on these rules, which differ across agreements. Thailand, for example, has 14-15 FTAs with different rules of origin requirements, creating compliance costs for firms and explaining why utilization rates for some FTAs remain relatively low. The conventional value criterion is not practically applicable to GMVC-type trade because economies typically add small incremental value rather than creating large domestic content, which goes against the nature of global value chains where small additions of value are the norm.

4) Electronics Sector Special Case

The electronics sector presents a special case because it comprises a significant portion of export profiles for economies like China; Malaysia; Thailand, yet these products are covered by the WTO's Information Technology Agreement (ITA), which provides tariff-free treatment for imports and exports. This means firms in global manufacturing value chains can import components, add value domestically, and export to other economies without needing to utilize FTA preferences, since electronics are already traded as duty-free goods under this multilateral agreement.

3. Policy Recommendations for the APEC Region

- **Limitations of FTA-Focused Approach:** Rising protectionist policies have sparked debates about pursuing more FTAs to mitigate trade tensions, but the nature of global manufacturing value chains itself limits the ability of Free Trade Agreements to boost trade as expected due to the inherent characteristics of global production networks and limitations imposed by trade agreement structures.
- **Four Alternative Policy Approaches:** First, economies may consider maintaining open trade and investment regimes with proactive foreign direct investment policies that facilitate the natural development of production networks across borders. Second, creating a business-friendly environment by keeping costs of doing business low is essential, which includes reducing regulatory red tape and minimizing the number of days required for business operations and approvals. Third, improving labor market conditions through appropriate laws and regulations while fostering cooperation with international organizations to enhance human capital development is crucial for supporting the skilled workforce requirements of modern manufacturing value chains. Fourth, capacity building and knowledge sharing across Asian economies is vital because participation in global manufacturing value chains represents a developmental progression where economies evolve their roles over time.
- **Developmental Progression Framework:** Asian economies may follow similar developmental pathways in engaging with global manufacturing value chains, emphasizing the importance of regional cooperation and knowledge transfer to facilitate this progression.
- **Regional Cooperation Priority:** APEC economies are suggested to prioritize enabling environments that support the natural evolution of production sharing relationships while addressing the practical barriers that prevent firms from fully utilizing existing trade preferences and participating effectively in global value chains.

II. Australia's Approach to Building Resilient Supply Chains through Regional Agreements

- **Ms. Christina LEES, Assistant Director, Supply Chain Resilience Section, Australian Department of Foreign Affairs and Trade**

Ms. Christina LEES is the Chair of the Competitiveness and Business Facilitation Committee under the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP). Christina specializes in international partnerships to strengthen supply chain resilience in the Indo-Pacific Economic and Supply Chains Branch of the Australian Department of Foreign Affairs and Trade.

1. Background

Australia's approach to building resilient supply chains is guided by a commitment to open, transparent, and rules-based trade. Traditional focus on FTA negotiations centered on reducing tariffs and increasing market access. However, there is evolution toward incorporating supply chain resilience and transparency as core elements in recent trade agreements, with domestic coordination through the Office of Supply Chain Resilience within the Department of Industry, Science and Resources.

Australia currently participates in three major RTAs: the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), the Regional Comprehensive Economic Partnership (RCEP), and the ASEAN-Australia-New Zealand Free Trade Area (AANZFTA). Regional trade and economic architecture provide a key opportunity for cooperation and establishing provisions leading to stronger supply chains.

2. Key Issues and Discussions:

1) CPTPP as Advanced Model

The CPTPP represents Australia's most advanced approach to embedding supply chain considerations into trade agreements, serving as a multilateral agreement among twelve parties that represent 14.4 percent of global GDP and 7.7 percent of the world's population, making it the world's fourth largest free trade area. It eliminates an estimated 95 percent of tariffs for goods trade between member parties and specifically aims to facilitate the development of production and supply chains among CPTPP members, with Chapter 22 containing dedicated supply chain provisions including a formal definition of supply chains. The Committee on Competitiveness and Business Facilitation promotes cooperation among members to enhance competitiveness, innovation, and business facilitation while developing and strengthening supply chains through information sharing, public-private dialogues, and encouraging small and medium enterprise participation.

2) CPTPP Performance Results

Performance data demonstrates the effectiveness of CPTPP's approach, with a commissioned report finding that the agreement helped boost overall trade in supply chain-related activities between members despite adverse COVID-19 impacts. Overall trade between CPTPP members increased 5.5 percent between 2018 and 2021, while trade between members where CPTPP created entirely new free trade relationships showed even stronger growth of 13.2 percent during the same period. The agreement is currently undergoing its first mandated five-year general review to assess operations and identify areas for potential updates and enhancements, with ministers delivering a statement at the Vancouver meeting highlighting global value chains and supply chain resilience as core pillars of collective economic prosperity.

3) RCEP Characteristics

RCEP represents the world's largest FTA by GDP, comprising over 30 percent of global GDP among its fifteen members, though it lacks specific supply chain provisions while including several indirect supportive features. The agreement's regional value content requirement of at least 40 percent promotes regional supply chain integration by allowing businesses to diversify suppliers across member states while still benefiting from preferential tariffs. RCEP aims to facilitate trade through simplified customs procedures with a 48-hour customs clearance window and includes chapters to facilitate digital trade and cross-border data flows, though these provisions operate more indirectly compared to CPTPP's explicit supply chain framework.

4) ASEAN-Australia-New Zealand Upgrade

The ASEAN-Australia-New Zealand Free Trade Area, originally signed in 2009 without specific supply chain provisions, underwent a significant upgrade that entered into force in April 2024 with new provisions aimed at diversifying and stabilizing regional supply chains. The upgraded agreement includes fast-tracking mechanisms for essential goods during humanitarian crises, epidemics, or pandemics, with perishable goods cleared within six hours of arrival and self-declaration of origin allowed for trusted exporters. A new chapter on micro, small, and medium enterprises was added to support integration into regional supply chains through market access promotion, information sharing, and capacity building initiatives.

5) Indo-Pacific Economic Framework (IPEF)

The IPEF represents a modern regional agreement focused on cooperation and economic integration among fourteen parties, though it differs from traditional FTAs by not lowering tariffs or opening goods and service markets. Instead, IPEF operates as a flexible framework with opt-in pillars including supply chains, clean economy, and fair economy, with all parties signing the Supply Chain Agreement in November 2023. The agreement establishes three collaborative bodies: the IPEF Supply Chain Council for developing sector-specific action plans, the Crisis Response Network serving as an emergency communications channel, and the Labor Rights Advisory Board promoting worker protections within supply chains.

3. Policy Recommendations for the APEC Region

- **Embed Supply Chain Provisions in Trade Agreements:** APEC economies, rather than relying solely on traditional tariff reduction approaches, could establish formal definitions and frameworks for supply chain cooperation while creating institutional mechanisms specifically focused on supply chain competitiveness and business facilitation. Trade agreements should include mandatory regular review processes to ensure supply chain provisions remain relevant and effective as global conditions evolve, following the CPTPP model of five-year comprehensive assessments that can identify areas for enhancement and updating.
- **Implement Flexible Rules of Origin:** Inputs from any regional party could be allowed to count toward originating status, promoting integration while setting achievable regional value content requirements such as RCEP's 40 percent model that enables businesses to diversify suppliers across member states while maintaining preferential treatment. The scope of goods eligible for originating status should be broadened to simplify logistics and increase tariff preference utilization, moving away from restrictive approaches that limit supply chain optimization opportunities.

- **Streamline Customs and Trade Facilitation:** Ambitious but achievable clearance timeframes could be established, with standard 48-hour processing for regular goods and accelerated six-hour processing for perishables, while promoting advanced rulings on tariff classifications and origin determinations to reduce uncertainty. Electronic customs documentation and paperless trade systems should be implemented across the region, with self-declaration of origin allowed for trusted exporters to reduce bureaucratic delays and transaction costs that burden especially smaller businesses.
- **Develop Crisis Response Mechanisms:** This represents a critical area requiring dedicated attention, with APEC economies developing emergency communication channels for coordination during supply chain disruptions and establishing pre-agreed fast-tracking procedures for essential goods during humanitarian crises, epidemics, or pandemics. Sector-specific action plans should be developed for critical industries and key goods, ensuring that essential flows can be maintained during emergencies through protocols established before crises occur rather than reactive responses.
- **Support Digital Trade Infrastructure:** Cross-border data flows essential for modern supply chain coordination could be facilitated while promoting e-invoicing, e-certificates of origin, and comprehensive digital trade documentation systems. Enhanced digital trade infrastructure interoperability across member economies could be prioritized, with barriers to cross-border data transfers that support supply chain management systems systematically reduced through coordinated policy approaches.
- **Prioritize MSME Integration:** Dedicated policy attention is required through specialized chapters in trade agreements that provide targeted support, recognizing these businesses' limited resources for navigating complex trade rules. Information sharing, capacity building, and market access initiatives should be specifically designed for smaller businesses, with simplified procedures that facilitate their participation in global value chains without overwhelming administrative burdens.
- **Adopt Risk-Based Domestic Approaches:** Coordinated government offices could be established for supply chain resilience, systematically assessing vulnerability, criticality, and residual risk while advocating for minimal intervention necessary to maintain critical supply chain resilience. Policy responses should focus on critical supply chain vulnerabilities impacting economies' interests while maintaining commitment to open-trade principles, avoiding protectionist measures that could undermine the cooperative architecture necessary for regional supply chain effectiveness.
- **Promote Cooperative Architecture:** Flexible frameworks that allow opt-in participation across different cooperation pillars could be emphasized, complementing existing FTAs rather than replacing them with entirely new institutional mechanisms. Tripartite bodies including worker, employer, and government representatives should be established for comprehensive approaches to supply chain resilience, building upon existing regional architecture to support the global rules-based trading system while addressing specific regional supply chain challenges through coordinated multilateral responses.

III. Legal Dimensions of Supply Chains in Trade Agreements

- Dr. Nany HUR, Research Fellow, Lee & Ko

Dr. HUR is a Research Fellow at Lee & Ko, advising corporate clients on public international and international economic law, including WTO, FTA, and ISDS matters. She has conducted legal research on topics like digital trade, services, ISDS, and trade environment issues.

1. Background

Trade agreements have evolved to contain norms that directly and indirectly influence the formation, operation, and diversification of global supply chains, with their main purpose being the removal of trade barriers between economies and obstacles to investment. These agreements create specific market conditions for inter-economy relations and promote the globalization of supply chains by providing legal compromises between economies to establish stable legal situations for global supply chains.

The legal framework supporting supply chains operates through multiple types of norms embedded in trade agreements, recognizing that different economies have varying domestic legislations that require harmonization through international agreements. Trade agreements serve as the primary mechanism for creating predictable and stable legal environments that businesses can rely on for planning procurement, production, and distribution across borders. Here, the scope of trade agreements has been expanding to address an increasingly broad range of issues affecting global supply chain operations.

2. Key Issues and Discussions:

1) Core Legal Norms Supporting Supply Chains

Rules of origin represent a fundamental norm that facilitates market access through streamlined and transparent frameworks, allowing firms to plan efficient sourcing and manufacturing while encouraging sourcing and processing within member economies. However, overly complicated rules of origin can discourage supply chain formation between economies, with cumulative rules enhancing flexibility within trade blocks, as demonstrated by the United States-Mexico-Canada Agreement (USMCA)'s stricter automobile rules compared to NAFTA affecting sourcing decisions.

Trade facilitation and customs procedures, including WTO Trade Facilitation Agreement provisions and FTA chapters addressing transparency and digital customs clearance, are critical for just-in-time supply chains where promptness is essential. Legal obligations affect customs documentation, risk management, and pre-arrival processing to facilitate efficient trade, particularly important for perishable goods that cannot withstand lengthy customs procedures.

Non-tariff measures, including technical barriers to trade and sanitary and phytosanitary measures, can significantly impede parts and components used in supply chains, with FTAs and WTO agreements requiring transparency and science-based justification for such measures. Investment protection norms, found in bilateral investment treaties and FTA investment chapters with investor-state dispute settlement provisions, protect upstream and downstream investments and provide legal remedies for supply chain disruptions caused by expropriation or unfair treatment.

Digital trade and data governance norms enable supply chain coordination through cross-border data flows, with digital trade chapters ensuring free data flows and limiting data localization requirements.

Labor and environmental standards are increasingly included as enforceable obligations in trade agreements, exemplified by Korea-EU FTA labor provisions and USMCA's rapid response labor mechanism for specific facilities.

2) Legal Certainty Requirements

Stable global supply chains require predictable trade rules including bound tariff rates, preferential tariff arrangements, and non-discrimination principles ensuring imported goods receive treatment no less favorable than their domestic counterparts. Regulatory transparency and coherence are essential, as sudden or opaque regulatory changes can disrupt supply chains, requiring advance notice, public consultation on new regulations, and harmonization or mutual recognition of standards.

Clear and effective dispute settlement mechanisms are crucial for legal certainty, including WTO dispute settlement understanding for multilateral rules and FTA dispute chapters that are often faster and more flexible than WTO mechanisms. Institutional and monitoring mechanisms through joint committees and subcommittees, along with private sector involvement through stakeholder advisory groups and public-private dialogues, enhance responsiveness and legitimacy.

3) Current Legal Landscape Challenges

The erosion of multilateral certainty has occurred with the WTO Appellate Body remaining paralyzed, undermining enforcement of WTO obligations while economies increasingly turn to regional and multilateral agreements. Unilateral measures-which have raised questions about the consistency with regional multilateral agreements-combined with lack of stronger countermeasures, weaken the legal binding power of even regional agreements.

The rise of economic security policies presents a significant challenge, with economies using this concept for legal justification of various measures including the United States continuing unilateral tariff measures and export controls, while China; the EU; and other economies respond with screening and localization requirements. Although legally defensible in certain cases under economic security rationales, these measures undermine predictability of trade flows and create uncertainty for cross-border supply chains.

These measures have proliferated across different economies including inbound and outbound investment screening, export controls, procurement restrictions, sanctions, and data protection requirements, all categorized under the economic security umbrella. Despite these challenges, some positive developments include resilience incorporation provisions for supply chains, exemplified by the IPEF Supply Chain Agreement as the first multilateral arrangement dedicated entirely to supply chain cooperation.

3. Policy Recommendations for the APEC Region

- **Strategic Regionalization and Flexible Frameworks:** APEC members could pursue strategic regionalization that balances resilience and sovereignty with openness and legal predictability through flexible institutional innovations and cooperative mechanisms. Rather than pursuing comprehensive regional FTAs covering all issues, economies could focus on selective rebinding and norm building through functional cooperation on specific issues separately, allowing for more targeted and effective approaches to particular challenges.
- **Adaptation to Security-Driven Environment:** The transformation from rules-based trade to discretionary security-driven policy requires APEC members to adapt their approaches while

maintaining some degree of predictability. Traditional FTA rules emphasizing market access and non-discrimination face challenges from economic security policies, requiring a shift from pure efficiency models to vigilance-based approaches that incorporate "just in case" rather than "just in time" models.

- **Diversification and Resilience Strategies:** APEC members are encouraged to incentivize diversification of suppliers and production bases while preparing for possible decoupling in critical sectors, recognizing that trade policy increasingly reflects strategic alignment rather than purely economic integration. Economies could promote domestic and near-shore production in strategic sectors while maintaining openness where possible to preserve the benefits of international trade.
- **Soft Law and Cooperative Mechanisms:** Soft law instruments, as demonstrated by the IPEF Supply Chain Agreement model, can yield materially effective results on sensitive issues even when lacking hard legal binding power through words like "may" or "shall endeavor." These approaches allow for commitments to information sharing, joint supply chain reviews, and emergency responses without the political difficulties associated with binding treaty obligations.
- **Institutional Innovation:** Innovative institutional mechanisms that can address the tension between traditional trade law predictability and emerging security concerns could be developed, creating frameworks that provide some degree of legal certainty while accommodating legitimate security considerations. This includes establishing clear criteria and processes for economic security measures to enhance predictability even within the security-driven policy environment.
- **Sector-Specific Approaches:** Rather than attempting comprehensive solutions, APEC members could pursue targeted approaches for specific sectors or issues, recognizing that different industries and supply chain segments may require different legal frameworks and cooperative mechanisms. This allows for more nuanced responses to the varying challenges faced across different types of supply chains while maintaining the benefits of international cooperation.

CLOSING REMARKS

Director Dong-ku LEE of the Regional Economic Organizations Division of ROK's MOFA thanked all participants for their presence and dedication to the workshop. In addition, he highlighted the main ideas from each of the sessions.

Session 1 focused on supply chain transformation drivers, with key messages that full reshoring is ineffective and that mercantilist approaches can undermine MSMEs and consumer welfare.

Session 2 featured best practices from the Republic of Korea and Malaysia, plus ABAC research, highlighting Korea's early-warning system and the first Supply Chain Stabilization Basic Plan as examples for other economies.

Session 3 examined logistics perspectives, digital tools, and data governance for improving supply chain visibility, emphasizing both physical trade aspects and effective data management.

Session 4 reviewed trade agreement provisions such as the CPTPP, RCEP, and IPEF and identified remaining gaps in supply chain frameworks.

RECOMMENDATIONS

Based on the forum's discussions and presentations, the following recommendations are proposed to advance the capacity of economies for resilient supply chains across the APEC region:

1. Enhance Digital Infrastructure and Data Governance
2. Strengthen MSME Integration and Support Systems
3. Modernize Trade Agreement Provisions
4. Build Crisis Response and Early-Warning Systems
5. Promote Sustainable and Inclusive Supply Chain Practices
6. Foster Public-Private Partnerships and Capacity Building

CONCLUSION

The Capacity Building Workshop on Resilient Supply Chain brought together policymakers, business leaders, academics, and international organizations from across APEC to examine one of the most pressing challenges of our time: ensuring that supply chains remain both efficient and resilient in the face of geopolitical tensions, technological shifts, climate risks, and global crises.

Discussions across the four sessions underscored a clear paradigm shift. Efficiency alone is no longer sufficient; resilience must be built into the design of global and regional supply chains. Participants agreed that this requires a combination of digital innovation, institutional coordination, inclusive support for MSMEs, and modernization of legal and trade frameworks.

Several cross-cutting messages emerged:

Visibility as the starting point: Data integration—ranging from customs and bills of lading to vessel tracking—provides the early-warning and transparency needed to anticipate disruptions and manage risks effectively.

Supporting the most vulnerable: MSMEs, which make up 90 percent of businesses in APEC, face the highest compliance burdens and are least able to absorb shocks. Their integration into resilient supply chains is critical for both inclusiveness and innovation.

Institutional and legal certainty: Predictable trade agreements, streamlined rules of origin, expedited customs procedures, and dispute settlement mechanisms are indispensable to investment and long-term planning.

Public–private collaboration: From Korea’s early-warning and governance models to Malaysia’s industrial policy, from ABAC’s MSME toolkit to Australia’s supply chain provisions in FTAs, best practices show that effective solutions emerge when governments and businesses act in concert.

Looking ahead, APEC economies face the dual challenge of maintaining openness and connectivity while preparing for increasingly frequent and severe disruptions. The workshop demonstrated that this balance is achievable through strategic regionalization, regulatory and digital harmonization, and targeted capacity building. By pursuing these pathways collectively, APEC can ensure that resilient, sustainable, and inclusive supply chains underpin the region’s growth and prosperity.