



Asia-Pacific
Economic Cooperation

APEC POLICY SUPPORT UNIT

POLICY BRIEF No. 70 (March 2026)

The Digital Transformation of Trade Facilitation in APEC

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KEY MESSAGES

- APEC economies are advancing from traditional trade facilitation toward digital, sustainable and interoperable trade systems aligned with the Putrajaya Vision 2040 and the Bangkok Goals. Trade digitalisation boosts efficiency and promotes sustainable resources use.
- APEC performs above the global average on the core dimensions of trade facilitation (87 percent vs 71 percent) although implementation gaps are apparent in several economies. Among the different core dimensions of trade facilitation, the highest implementation levels are recorded in transparency and formalities.
- APEC member economies are ahead of the rest of the world in implementing digital trade facilitation measures (82 percent vs 62 percent). However, seamless interoperability across borders is constrained by inadequacies in areas such as legal infrastructure, digital readiness, technical standards and implementation of specific cross-border exchanges.
- APEC economies have made substantial progress in agricultural trade facilitation, establishing timely and internationally accredited testing facilities to ensure exports meet major trading partners' standards. Many have also implemented economy-wide standards, accreditation bodies and mutual recognition agreements to streamline compliance.
- There remains considerable room for improvement in involving small and medium enterprises (SMEs) in trade facilitation. Official mechanisms that actively involve SMEs should be established more widely in APEC economies. Additionally, single window systems can be improved to better meet the specific needs of SMEs.
- Digitalisation and sustainability are mutually reinforcing goals. As economies invest in digital trade systems, it is essential to simultaneously enhance sustainability efforts. This enables economies to fully realise the benefits of paperless trade, including reduced transaction costs and better environmental outcomes.
- APEC economies have made progress on waste trade facilitation. Overall, more work needs to be done to ramp up digital sustainability reporting tools; streamline procedures for green goods; strengthen adoption of eCITES (electronic management of permits under the Convention on International Trade in Endangered Species of Wild Fauna and Flora); and improve mechanisms for environmentally sound waste trade.
- Trade cost modelling shows that an ambitious World Trade Organization (WTO) Trade Facilitation Agreement Plus (TFA+) paperless trade scenario is associated with about 5.6 percent trade cost reduction when fully implemented.
- Strategic APEC initiatives – the Connectivity Blueprint, the Supply Chain Connectivity Framework Action Plan III (SCFAP III) and the APEC List of Environmental Goods – collectively support the region's trade facilitation, digitalisation and sustainability goals.

Introduction

Trade facilitation in APEC has evolved from a traditional emphasis on procedural simplification, toward fostering digital, sustainable and interoperable trade systems that underpin quality growth. With almost all APEC members implementing the World Trade Organization (WTO) Trade Facilitation Agreement (TFA), future opportunities driven by new technologies and stronger collaboration promise significant gains.

This shift aligns closely with the Putrajaya Vision 2040 and the Bangkok Goals on the Bio-Circular-Green (BCG) Economy, both of which link economic efficiency with sustainability, innovation and resilience.

Paperless trade – the digital exchange of trade-related data and documents – reduces resource use, courier emissions, and waste, improving both efficiency and environmental performance. A complete transition to paperless trade is projected to eliminate 36 million tons of carbon dioxide (CO₂) emissions annually, equivalent to planting over 1 billion trees.¹ These environmental benefits arise from lower paper consumption, the elimination of physical document delivery, reduced office energy use and shorter cargo storage durations.

At the firm level, stricter global environmental standards are increasingly compelling businesses to enhance production and supply chain practices; failure to do so could risk exclusion from key international markets.² In fact, complying with mandated environmental standards has been shown to help firms better integrate into global markets. A study of 15,922 firms across 32 economies found that a one-standard deviation increase in a firm's environmental performance index (measuring adoption of environmental actions) increased the probability of global value chain (GVC) participation by 6.4 percentage points.³

The APEC Business Advisory Council (ABAC) complements these efforts through its Climate Leadership Principles for Business⁴ that seeks to guide companies in adopting best practices for climate change.

Beyond greenhouse gas (GHG) reductions, trade digitalisation plays an essential role in protecting biodiversity, promoting sustainable resource use and building the credibility of environmental reporting and certification systems. The integration of digital tools strengthens traceability and verification mechanisms for environmentally sensitive goods such as timber and wildlife. Under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), more than 500 tree species are now regulated to ensure that global trade meets provisions on 'sustainability, legality, and traceability'.⁵

Digital systems also allow firms and regulators to not only fulfil sustainability compliance requirements; but also track the legality, source and environmental impact of goods throughout the global supply chain. APEC economies are increasingly applying forensic wood identification technologies – such as machine vision, DNA barcoding, stable isotope analysis, and spectroscopy – to verify the legality and origin of traded timber, including CITES-listed species. Likewise, eCITES provides digital permits and exchange for endangered species trade, reducing costs and fraud while improving traceability.⁶

Against this backdrop, a comparable framework is needed to assess how economies are translating trade facilitation commitments into practice, particularly as reforms expand beyond traditional efficiency objectives toward digitalisation and sustainability. The United Nations Global Survey on Digital and Sustainable Trade Facilitation (UNTF) provides such a framework, offering a basis for examining implementation across economies.

¹ Y. Duval and S. Hardy, "A Primer on Quantifying the Environmental Benefits of Cross-border Paperless Trade Facilitation," United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), 2021, <https://artnet.unescap.org/publications/working-papers/primer-quantifying-environmental-benefits-cross-border-paperless-trade>

² G. O'Meara et al., "Helping Businesses Build and Maintain Open, Secure and Resilient Supply Chains" (APEC, 2024), https://www.apec.org/docs/default-source/publications/2024/1/224_psu_resilient-supply-chain.pdf

³ R. D. L. Paschoaleto and I. Martínez-Zarzoso, "Environmental Regulations and Firms' Integration in Global Markets: Using a New Environmental Performance Index," *Empirica* 51 (2024): 829–76, <https://doi.org/10.1007/s10663-024-09612-4>

⁴ APEC Business Advisory Council (ABAC), "Report to APEC Economic Leaders 2021: People, Place and Prosperity / Tāngata, Taiao me te Taurikura" (ABAC, 2021), Annex C, https://www.sbf.org.sg/docs/default-source/internationalisation/international-advocacy/abac_report_2021.pdf?sfvrsn=8ae11dab_1

⁵ APEC Experts Group on Illegal Logging and Associated Trade (EGILAT), "Development of Integrated Timber Data for Enhancing Legal Timber Trade in the Asia-Pacific Region," APEC, 2024, https://www.apec.org/docs/default-source/publications/2024/6/224_egilat_integrated-timber-data-development-rp.pdf?sfvrsn=2a1e18a9_1

⁶ ESCAP, "eCITES: Information Management and Automated Processes to Strengthen the Implementation of the Convention," presentation slides, n.d., https://www.unescap.org/sites/default/files/1_eCITES%20Information%20management.pdf

UN Global Survey on Digital and Sustainable Trade Facilitation (2025 update)

The UNTF aims to support economies in evaluating and streamlining cross-border trade. Coordinated by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) in cooperation with other UN Regional Commissions and the United Nations Conference on Trade and Development (UNCTAD), the survey encompasses more than 180 economies worldwide.

The survey covers a WTO TFA+ set of 62 trade facilitation measures categorised into 12 sub-groups, namely: transparency; formalities; institutional arrangement and cooperation; transit facilitation; paperless trade; cross-border paperless trade; trade facilitation for small and medium enterprises (SMEs); agricultural trade facilitation; trade facilitation and women; trade facilitation for e-commerce; green trade facilitation; and trade finance for trade facilitation.

Building on this global framework, the following section focuses on how APEC economies perform relative to global benchmarks, highlighting both areas of strength and remaining implementation gaps. The next section reviews 31 core trade facilitation measures spanning 'general' and 'digital trade facilitation' measures, followed by an analysis focusing on digital, sustainable and green trade facilitation.

Trade facilitation and implementation in APEC

The 2025 UNTF shows that APEC continues to perform above the global average across the core dimensions of trade facilitation, though some implementation gaps remain in several economies.

Figure 1 shows that the overall implementation rate across APEC economies for the 31 core measures stands at 87 percent, well above the global average of 71 percent, reflecting continued progress in advancing trade digitalisation and regulatory cooperation. This strong performance underscores the region's success in translating WTO TFA commitments into substantive reforms that harness emerging technologies to simplify, automate and secure trade processes. Australia; Japan; the Republic of Korea; New Zealand; and Singapore have nearly achieved full implementation, with China; Malaysia; the Philippines; and the United States following closely.

Among the different core dimensions of trade facilitation, the highest implementation levels are recorded in 'transparency' and 'formalities', with an average implementation rate (normalised) of 90 percent and above. The excellent performance on transparency reflects generally full implementation of measures such as online publication of import-export regulations, stakeholder consultation and advance publication of trade regulations. Nevertheless, several economies have yet to fully operationalise advance rulings on tariff classification and origin (four economies) and an independent appeal mechanism (six economies). These gaps may continue to undermine predictability for traders, hindering regulatory compliance and dispute resolution processes.

The strong performance on formalities corresponds to substantial progress on key measures including pre-arrival processing, risk management, post-clearance audits, acceptance of copies for trade formalities, and expedited shipments. The robust implementation of these measures signals that many APEC economies are modernising border procedures to make them more efficient, predictable and compliant with international standards.

APEC economies have an average 79 percent implementation rate for 'institutional arrangement and cooperation' measures, which enhance collaboration and coordination among government agencies and trade partners. Notably, only six APEC economies have fully implemented the measure of agencies delegating border controls to Customs.

With foundational measures largely in place, many APEC economies have increasingly shifted their reform efforts toward digitalising trade procedures. Digital trade facilitation, which includes 'paperless trade' and 'cross-border paperless trade', represents a natural next step in reducing trade costs while improving speed, predictability and resilience.

Implementation of digital trade facilitation

Digital trade facilitation uses information and communications technology (ICT) and digital tools to automate trade processes, cutting costs and speeding up border crossings. It includes two interconnected sub-groups: 'paperless trade', which replaces paper documents with electronic systems, enabling information and document exchange between stakeholders within each economy; and 'cross-border paperless trade', which enables economies to exchange trade data and documents electronically through established mechanisms.

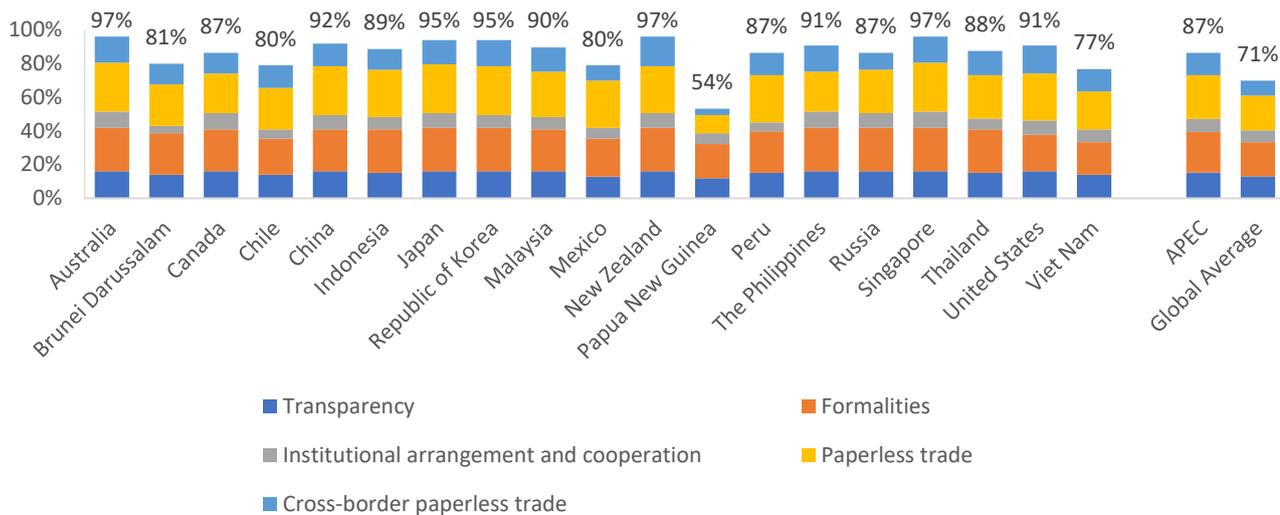


Figure 1. Overall trade facilitation implementation in APEC economies (31 core measures)

Note: Scores were not available for Hong Kong, China; and Chinese Taipei.
 Source: UN Global Survey on Digital and Sustainable Trade Facilitation (UNTF), 2025 data.

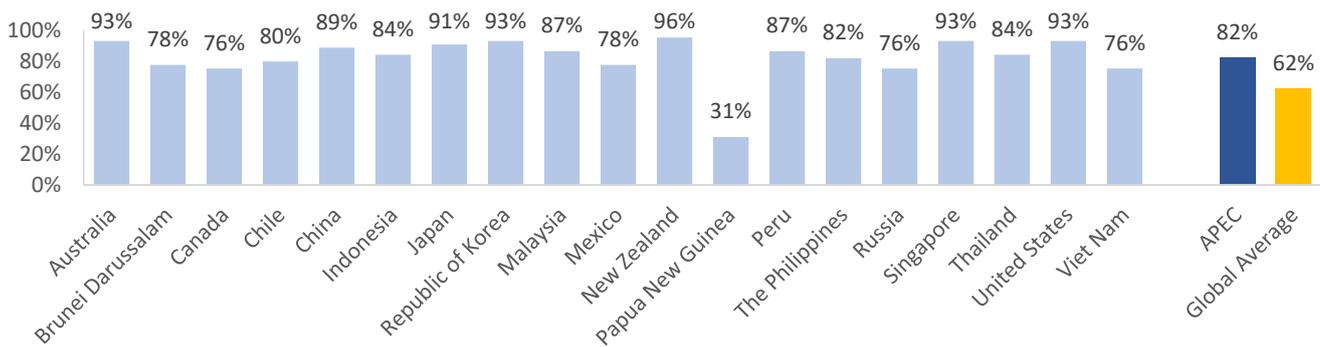


Figure 2. Implementation of digital trade facilitation in APEC economies

Note: Implementation rates are normalised to 100. Scores were not available for Hong Kong, China; and Chinese Taipei.
 Source: UNTF, 2025 data.

a. Paperless trade

APEC member economies are implementing paperless trade measures at a remarkably high rate, with an average of 89 percent (normalised). This demonstrates significant engagement with initiatives such as automated customs systems, electronic single windows, electronic submission of declarations and permits, e-certification and electronic payment of duties. These digital tools enable traders to lodge documentation electronically, streamline processing, make payment online and reduce reliance on paper-based workflows.

b. Cross-border paperless trade

Of the sub-groups for the core trade facilitation measures, cross-border paperless trade demonstrates comparatively lower performance, with a 71 percent implementation rate on average within APEC. Cross-

border paperless trade represents a more advanced stage of implementation, requiring not only technology, but also legal interoperability and mutual trust between trading partners. This entails support for seamless electronic exchange and legal recognition of trade documents across international borders.

While most APEC economies have already established domestic electronic single windows and digital customs systems, true interoperability across borders is still constrained by inadequacies in legal infrastructure, technical standards and implementation of specific cross-border exchanges. Only two APEC economies have fully implemented electronic customs declaration exchange; just one has done so for certificates of origin, and none for sanitary and phytosanitary (SPS) certificates.

In addition, low digital readiness continues to limit seamless cross-border data exchange. The lack of stable and efficient network services in some economies also poses a practical obstacle to full implementation of end-to-end electronic processes.⁷

On average (Figure 2), APEC economies are ahead of the rest of the world in terms of progress in implementing digital trade facilitation measures (82

percent vs 62 percent) although performance varies within APEC. Among individual economies, top performers in digital trade facilitation include New Zealand at 96 percent alongside Australia; the Republic of Korea; Singapore; and the United States at 93 percent.

Digital trade facilitation is accelerating as economies quickly adopt new technologies (see Box 1). While

Box 1. Artificial intelligence (AI) in trade facilitation: Opportunities, risks and policy considerations

Disruptive technologies such as the Internet of Things (IoT) and blockchain have brought about promising and transformative changes to trade processes, lowering costs and enabling more seamless connectivity. Trade facilitation is undergoing further evolution, with artificial intelligence (AI) fuelling a shift beyond digitisation toward predictive, data-driven decision-making through smarter, intelligence-driven systems.

Across supply chains, AI supports anomaly detection, process and route optimisation, and information extraction from physical and digital records, while in e-commerce it can flag inconsistencies in shipment data – such as goods descriptions, origin or destination – to reduce fraud risks and delays.^a The application of AI in customs clearance, logistics and trade documentation processes can contribute to reduced border delays, lower trade-related costs and enhanced competitiveness.^b

AI's efficacy comes from the ability to make prediction cheaper and more reliable, which increases the importance of data quality, system integration, organisational design and human judgement.^c In customs and border infrastructure, this means AI delivers the greatest productivity gains when embedded across port, digital and transport systems, with performance improvements depending on how well enhanced predictions are translated into 'smart, actionable results to the right people' rather than used only for monitoring.^d

Despite its potential benefits, AI presents challenges, as complex models with millions of parameters can operate as 'black boxes', reducing transparency and making it difficult to understand or assess decision outcomes. One way to address this is through a human-in-the-loop (HITL) approach, where humans are an integral part of decision-making in automated processes, such that AI is used to inform decisions rather than substitute for them. Under this arrangement, customs officers retain the ability to review and confirm AI-based recommendations, ensuring that automation enhances – rather than displaces – professional judgement and operational experience.^e

In terms of costs, the adoption of AI solutions can require significant upfront investment in data infrastructure, computing resources, system integration and cybersecurity, while also involving ongoing costs related to model maintenance, system updates, data management and governance arrangements.^f Only 25 percent of chief executive officers (CEOs) say AI projects have met return on investment (ROI) expectations, but 85 percent expect scaled AI investments to yield positive returns by 2027.^g To address budgetary issues and capital costs, public-private partnerships are a potential solution to mitigate financial issues and technological obsolescence.

Source:

^a United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT), "White Paper on the Use of Artificial Intelligence in Trade Facilitation," United Nations Economic Commission for Europe (UNECE), 2023, https://unece.org/sites/default/files/2024-04/WhitePaper-Use-Artificial-Intelligence-TF_Eng.pdf

^b PwC, "AI Works for Governments," 2025, <https://www.pwc.com/gx/en/ai-services/ai-works-for-governments.pdf>

^c A. Agrawal, J. Gans, and A. Goldfarb, *Power and Prediction: The Disruptive Economics of Artificial Intelligence* (Harvard Business Review Press, 2022).

^d US Department of Transportation, "Artificial Intelligence and Machine Learning for Transportation," 2021, <https://www.itskrs.its.dot.gov/briefings/executive-briefing/artificial-intelligence-and-machine-learning-transportation>

^e World Customs Organization (WCO), "Detailed Report on the Adoption of Artificial Intelligence and Machine Learning in Customs" (WCO, 2025), https://www.wcoomd.org/-/media/wco/public/global/pdf/topics/facilitation/activities-and-programmes/smart-customs/public-version_detailed-report-on-the-adoption-of-ai-and-ml-in-customs.pdf

^f US Department of Transportation, "Artificial Intelligence and Machine Learning for Transportation."

^g IBM, "IBM Study: CEOs Double Down on AI while Navigating Enterprise Hurdles," IBM Newsroom, 6 May 2025, <https://newsroom.ibm.com/2025-05-06-ibm-study-ceos-double-down-on-ai-while-navigating-enterprise-hurdles>

⁷ APEC Policy Support Unit (PSU), "Promoting the Utilization of Paperless Trade Platforms in the Post COVID-19 Era" (APEC, 2025), https://www.apec.org/docs/default-source/publications/2025/5/225_psu_paperless-trade-platforms.pdf

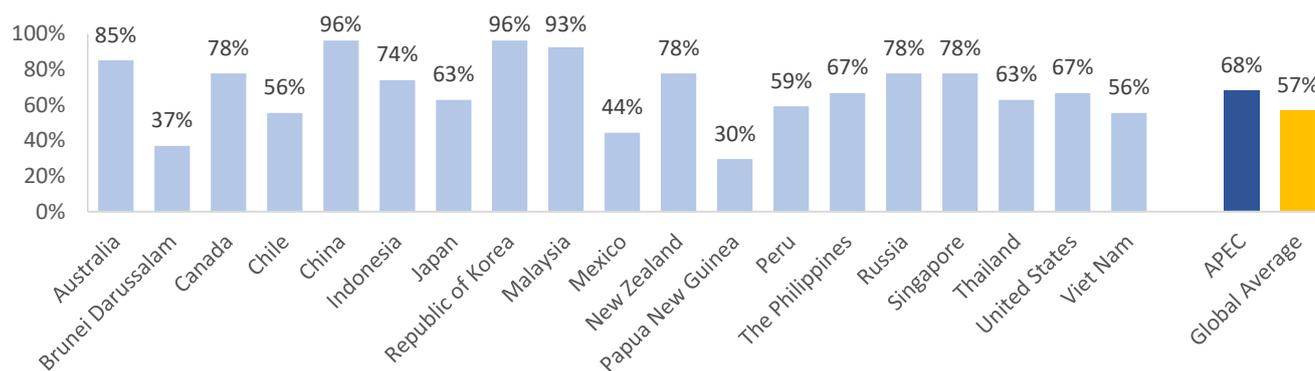


Figure 3. Implementation of SME and agricultural trade facilitation in APEC economies

Note: Implementation rates are normalised to 100. Scores were not available for Hong Kong, China; and Chinese Taipei.

Source: UNTF, 2025 data.

implementation takes time, these solutions reduce costs and processing times, in addition to improving accuracy and security in cross-border trade.⁸

Sustainable trade facilitation

Beyond efficiency and speed, trade facilitation reforms are increasingly expected to support broader sustainability objectives. Gradually, economies are beginning to integrate environmental and social considerations into trade facilitation frameworks, complementing digital reforms.

‘Sustainable trade facilitation’ is a core component of the UNTF, with the survey including measures for ‘trade facilitation for SMEs’ and ‘agricultural trade facilitation’. Together, these measures address structural barriers that limit participation in international trade, with the aim of promoting more broad-based and resilient economic growth.

The ‘trade facilitation for SMEs’ measure evaluates the presence of government policies that streamline trade, through accessible information; targeted support programmes; simplified customs procedures; single window systems; involvement in policymaking; and reductions in compliance costs.

The ‘agricultural trade facilitation’ measure examines the effectiveness of government efforts to assist agricultural exporters, focusing on SPS compliance, recognition of standards internationally, digital certification processes and special provisions for perishables at border crossings.

Figure 3 shows the implementation rates (scaled to 100) for sustainable trade facilitation involving SMEs and agriculture in APEC economies. It also provides as a comparison both the APEC and global averages. The average implementation rate in APEC is around 68 percent while the global average is lower at approximately 57 percent.

a. Trade facilitation for SMEs

Relatively weaker and uneven performance is observed under ‘trade facilitation for SMEs’, reflecting variation in the extent to which economies have fully implemented the relevant UNTF measures. Implementation is strongest for trade-related information measures for SMEs, where 15 APEC economies reported full implementation. This indicates that these economies have put in place measures to ensure that trade-related information is publicly available, easily accessible and presented in a manner that supports SMEs in understanding and complying with trade procedures.

For the measure on SME participation in national committee(s) on trade facilitation, only five economies – Australia; Canada; China; Malaysia; and Russia – reported full implementation, suggesting that formal mechanisms to involve SMEs in trade facilitation policymaking are present in relatively few economies. Similarly, for the measure on SME-friendly Authorised Economic Operator (AEO) programmes, only four economies reported full implementation. In these cases, AEO schemes include features that facilitate SME participation – such as adjusted eligibility criteria, simplified procedures or reduced compliance costs –

⁸ United Nations (UN), “Digital and Sustainable Trade Facilitation: Global Report 2025: Based on the United Nations Global Survey on Digital and Sustainable Trade Facilitation” (UN, 2025), <https://www.untfsurvey.org/files/documents/2025-UNTF-Global-Report.pdf>

and enable SMEs to benefit from trade facilitation incentives comparable to those available to larger firms.

Implementation is also low for the measure on SME access to single window systems. Only three economies – China; the Republic of Korea; and Malaysia – reported full implementation, indicating that in most APEC economies, existing single window platforms do not yet adequately consider the specific needs and challenges faced by SMEs in terms of accessibility and usability.

b. Agricultural trade facilitation

APEC economies have generally demonstrated strong performance in the area of ‘agricultural trade facilitation’: 15 APEC economies possess timely, sufficient and internationally accredited testing facilities. These facilities play a crucial role in ensuring that agricultural exports consistently meet the SPS standards of their major trading partners.

In addition, 14 economies have established economy-wide standards and accreditation bodies. These institutions facilitate compliance with SPS standards and are supported by mutual recognition agreements (MRAs) with trading partners. Furthermore, 12 economies reported that perishable goods receive systematic prioritisation and protection at border crossings. This is achieved through both fast-track

clearance procedures and the provision of cold storage infrastructure, ensuring that sensitive products retain their quality and value during transit and clearance. On the measure ‘e-application/issuance of SPS certificates’, nine economies have achieved full implementation, that is, they have established a transparent and fully digital system for applying for and issuing SPS certificates electronically.

Trade digitalisation and sustainable trade facilitation

Sustainable trade facilitation complements digital trade by promoting environmentally responsible practices and ensuring that trade benefits reach disadvantaged groups. Figure 4 reveals that across APEC economies, trade digitalisation and sustainable trade facilitation move in tandem. With most members performing above the global benchmarks of 62 percent and 57 percent, respectively, on these measures, the region is clearly advancing toward a more efficient, transparent and environmentally sustainable trading environment.

Regional frontrunners such as Australia; China; the Republic of Korea; and Malaysia recorded very strong (above 80 percent) implementation in both dimensions, supported by robust digital infrastructure and well-integrated sustainability frameworks. These economies illustrate how end-to-end digital systems – such as

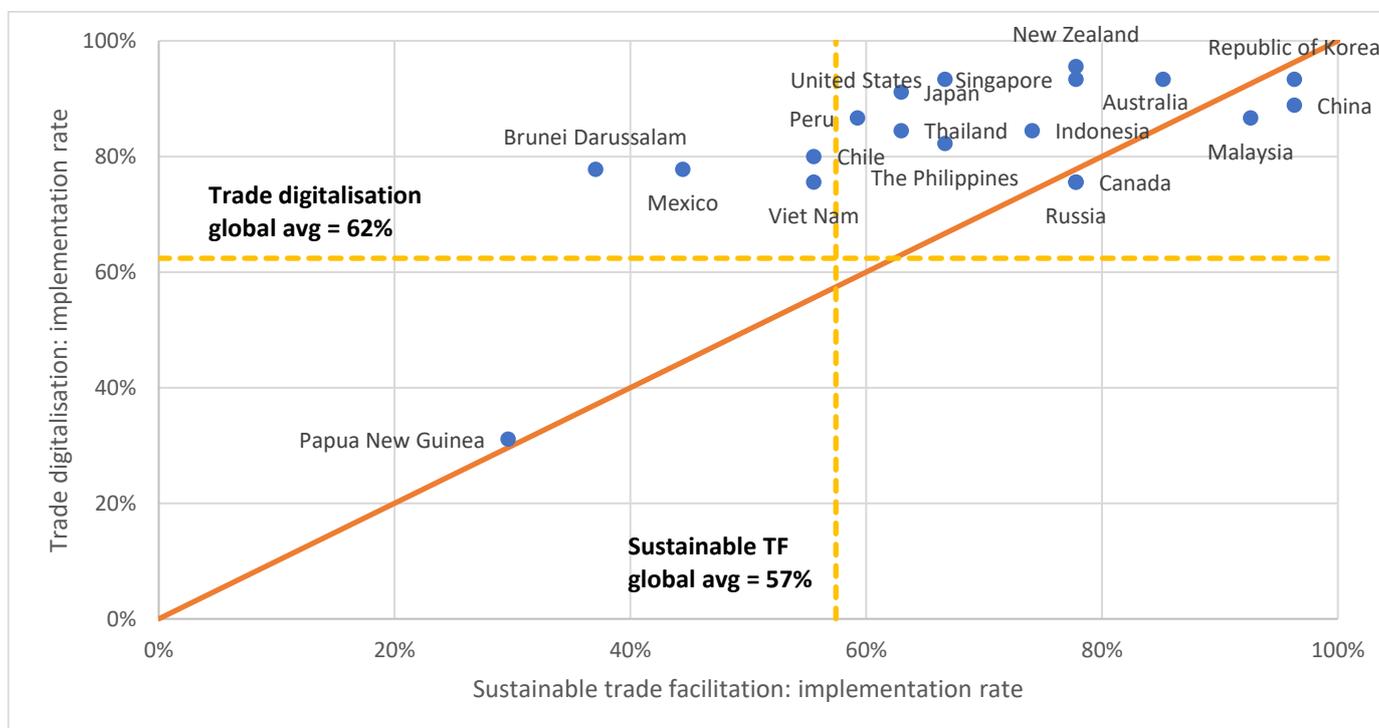


Figure 4. Implementation of trade digitalisation and sustainable trade facilitation in APEC, 2025

Note: TF=trade facilitation. Scores were not available for Hong Kong, China; and Chinese Taipei.

Source: UNTF, 2025 data.

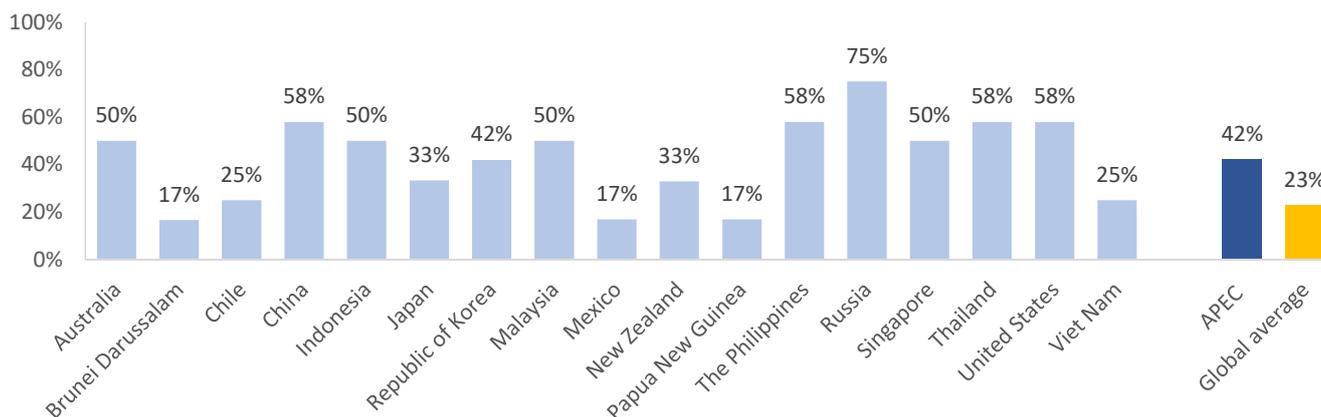


Figure 5. Green trade facilitation in APEC, 2025

Note: Scores were not available for Canada; Hong Kong, China; Peru; and Chinese Taipei.
Source: UNTF, 2025 data.

electronic single windows, e-certification and digital customs platforms – can simultaneously streamline border processes, strengthen transparency and reduce the carbon footprint or environmental impact of trade.

Digitalisation and sustainability should be viewed as mutually reinforcing priorities. Economies investing in digital trade infrastructure must concurrently strengthen sustainability measures to achieve the ‘dual dividends’ of paperless trade reforms, that is, lower trade costs and improved environmental performance.

Green trade facilitation

Green trade facilitation refers to the nexus of trade policy and environmental stewardship, focusing on how trade systems can advance climate goals while mitigating environmental risks and fostering sustainable business practices.

Newly incorporated into the 2025 edition of the UNTF, ‘green trade facilitation’ covers four measures that investigate economies’ sustainability reporting, facilitation of green and climate-smart goods, adoption of eCITES digital permits and facilitation of legitimate waste in trade. Results indicate that most APEC economies outperform the global average of 23 percent (Figure 5).

Significant implementation levels are observed across several economies, with Russia leading at 75 percent, followed by, all at 58 percent, China; the Philippines; Thailand; and the United States. A group of economies – including Australia; Indonesia; Malaysia; and Singapore – cluster around the 50 percent level. A few members have notably lower implementation rates of around 17 percent, highlighting the considerable disparities across the region.

Overall, significant room remains to scale up digital sustainability reporting tools, streamline procedures for green goods, strengthen eCITES adoption and improve mechanisms for environmentally sound waste trade. Notably, the Philippines is the only economy with full implementation of ‘facilitation of sustainability reporting for traded goods’ measure, while other economies have achieved only partial or no implementation.

In the area of green and climate-smart goods, no economy has achieved full implementation, with only Australia; Indonesia; and Russia making partial progress, signalling substantial room for improvement. The implementation of eCITES application, issuance and exchange also remains weak, with all APEC economies at partial implementation at best.

Where APEC economies have made considerable progress has been on waste trade facilitation. Chile; Russia; and the United States have attained full implementation. In these economies, governments have established comprehensive regulatory and procedural frameworks (through electronic means) that govern the legitimate trade of waste and harmful substances, ensuring alignment with international standards.

Impact of trade facilitation implementation on trade costs of APEC economies

Trade facilitation measures play a pivotal role in ensuring that trade across borders becomes more seamless and efficient. Among the variety of benefits that trade facilitation offers, one stands out to businesses and governments in the trade landscape: reduced trade costs.

Trade costs can arise at different points in the trade process, from unpredictability such as time delays at

Economy	Total trade flows (exports)	Trade flows contributed by paperless trade platforms	Percentage of total trade flows contributed by paperless trade platforms
	(USD billion)	(USD billion)	
Canada	494.9	18.3	3.7%
Chile	91.5	3.3	3.6%
China	3,110.5	96.9	3.1%
Republic of Korea	602.9	9.2	1.5%
Mexico	462.9	22.3	4.8%
Peru	54.6	4.2	7.6%
Singapore	422.0	4.4	1.0%
United States	1,660.5	77.7	4.7%
Total	6,899.6	236.2	3.4%

Table 1. Impact of paperless trade platforms usage on trade flows, 2021

Source: APEC Policy Support Unit (PSU), "Promoting the Utilization of Paperless Trade Platforms in the Post COVID-19 Era" (APEC, 2025), https://www.apec.org/docs/default-source/publications/2025/5/225_psu_paperless-trade-platforms.pdf

customs, to inefficiencies arising from burdensome paper documents. On average, these costs are equivalent to imposing a 100 percent tariff, effectively making traded goods twice as expensive as similar goods produced and sold domestically.⁹ Lowering trade costs thus plays a crucial role in shaping trade outcomes, as it can help boost wider participation in global supply chains and drive broad-based economic growth.

Earlier APEC research suggests that the partial implementation of trade digitalisation measures can reduce international trade costs by 4.10 percent, while full implementation is estimated to lower trade costs by 6.95 percent.¹⁰

Additionally, 2021 data show that paperless trade platforms increased trade flows by USD 236.2 billion, or 3.4 percent of total trade, across the eight APEC economies studied (Table 1).

Many agreements and initiatives continue to contribute to the trade facilitation agenda by seeking to remove red tape and inefficiencies across the processes that make up global trade. One such agreement is the WTO TFA. On digitally enabled trade, the TFA contains provisions to help ease the publication and availability of information, among other areas.¹¹ The TFA entered into force in 2017 and most APEC economies have reported full implementation. A complementary agreement dedicated to trade digitalisation is the Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific. This UN treaty entered into force in 2021 and has seen an increasing number of APEC economies join it, including Thailand in October 2025.¹² Many APEC economies are also increasingly engaged in dedicated digital economy agreements.¹³

To understand the effect of the implementation of trade facilitation measures in APEC, an analysis has been performed using a trade cost model based on data from the UNTF.¹⁴ The model estimates the trade cost

⁹ World Bank, "Chapter 3: High Trade Costs: Causes and Remedies," in *Global Economic Prospects* (World Bank, June 2021), <https://thedocs.worldbank.org/en/doc/600223300a3685fe68016a484ee867fb-0350012021/related/Global-Economic-Prospects-June-2021-Topical-Issue-1.pdf>

¹⁰ APEC Policy Support Unit (PSU), "Promoting the Utilization of Paperless Trade Platforms in the Post COVID-19 Era" (APEC, 2025), https://www.apec.org/docs/default-source/publications/2025/5/225_psu_paperless-trade-platforms.pdf

¹¹ World Trade Organization (WTO), "Easing Trade Bottlenecks of Landlocked Developing Countries" (WTO, 2021), <https://doi.org/10.30875/9789287054227>

¹² More information and a list of existing parties are available from: <https://www.unescap.org/projects/cpta>

¹³ ESCAP, "Digital Trade Regulatory Review for Asia and the Pacific, 2025: Highlights and Recommendations" (UN, 2025), <https://www.unescap.org/kp/2025/digital-trade-regulatory-review-asia-pacific-2025>

¹⁴ Based on the trade cost model in Y. Duval, C. Utoktham, and A. Kravchenko, "Impact of Implementation of Digital Trade Facilitation on Trade Costs," Asia-Pacific Research and Training Network on Trade (ARTNeT) Working Paper 174, 2018, <https://www.econstor.eu/bitstream/10419/177771/1/AWP174.pdf>

benefits under various scenarios, across different levels of trade facilitation implementation by economies.¹⁵

Table 2 (Model 1) shows that when APEC economies achieve implementation of the binding and non-binding provisions in the WTO TFA, they would enjoy trade cost reductions of 0.3 percent (partial implementation) and 1.9 percent (full implementation). Further, implementation of an ambitious WTO TFA+ paperless trade scenario is associated with significantly higher benefits: overall trade costs are reduced by 1.8 percent when partially implemented, and this increases substantially to 5.6 percent in the case of full implementation.

Model 1 underscores the importance of focusing on full implementation of both the WTO TFA provisions and paperless trade facilitation measures, as trade cost reductions from implementing WTO TFA+ is more than five times that of implementing only binding WTO TFA measures. Table 2 (Model 2) further illustrates that full implementation of digital trade facilitation measures alone could bring about close to a 4 percent average reduction in trade costs in the APEC region.

Figure 6 illustrates how much trade costs can be reduced based on the extent of implementation of trade facilitation measures by APEC economies. Across all economies, full implementation of WTO TFA measures

(binding and non-binding) and other paperless trade measures, compared to partial implementation, is associated with trade cost reductions of up to 23 percent.

The analysis also shows that economies with relatively lower trade facilitation implementation rates are poised to reap significantly higher trade cost benefits compared to their counterparts. Papua New Guinea stands to gain the most from full implementation of the WTO TFA and other paperless trade measures (23 percent reduction in trade costs) at this stage. Other developing economies such as Mexico and Viet Nam also have potential trade cost reductions of nearly 10 percent from WTO TFA+ trade digitalisation reform.

Nevertheless, economies with trade facilitation implementation rates above 90 percent (Australia; Japan; Republic of Korea; New Zealand; Singapore) can still reap trade cost benefits of 1–2 percent if they implement trade digitalisation measures above and beyond those in the WTO TFA. In particular, cross-border paperless trade initiatives are key for these economies to further enhance trade efficiency. Estimates of the impact of specific sets of paperless trade measures for specific economy pairs or groups may be calculated using the Trade Intelligence and Negotiation Adviser (TINA)'s impact simulator.¹⁶

Trade cost model	WTO TFA (binding + non-binding)		WTO TFA+ (binding + non-binding + other paperless and cross-border paperless trade)	
	Partially implemented	Fully implemented	Partially implemented	Fully implemented
Model 1				
Overall trade facilitation	-0.33%	-1.86%	-1.76%	-5.60%
Model 2				
General trade facilitation measures	-0.18%	-1.37%	-0.44%	-1.87%
Digital trade facilitation measures	-0.16%	-0.40%	-1.45%	-3.71%

Table 2. Changes in trade costs in APEC with varying degrees of trade facilitation implementation

TFA=Trade Facilitation Agreement; WTO (World Trade Organization)

Note: Model 1 examines the effects of overall trade facilitation, while Model 2 offers a further breakdown, examining both the effects of general trade facilitation measures that are connected to the WTO TFA, and digital trade facilitation measures that lie outside the TFA's coverage. The effects under two scenarios are examined. 'Partially implemented' is when all economies that have not implemented trade facilitate measures act and implement, at least partially, all measures in each category. 'Fully implemented' is when economies that have not fully implemented measures act and implement measures fully. Source: United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) calculations.

¹⁵ Three categories are presented in the trade cost model: (1) WTO TFA (binding only); (2) WTO TFA (binding + non-binding); and (3) WTO TFA+ (binding + non-binding + other paperless and cross-border paperless trade).

¹⁶ For example, see Trade Intelligence and Negotiation Adviser (TINA), "Trade Facilitation: Digital and Sustainable Trade Facilitation in Thailand and China," accessed 26 February 2026, <https://tina.trade/app/dashboard/THA-CHN/trade-facilitation>

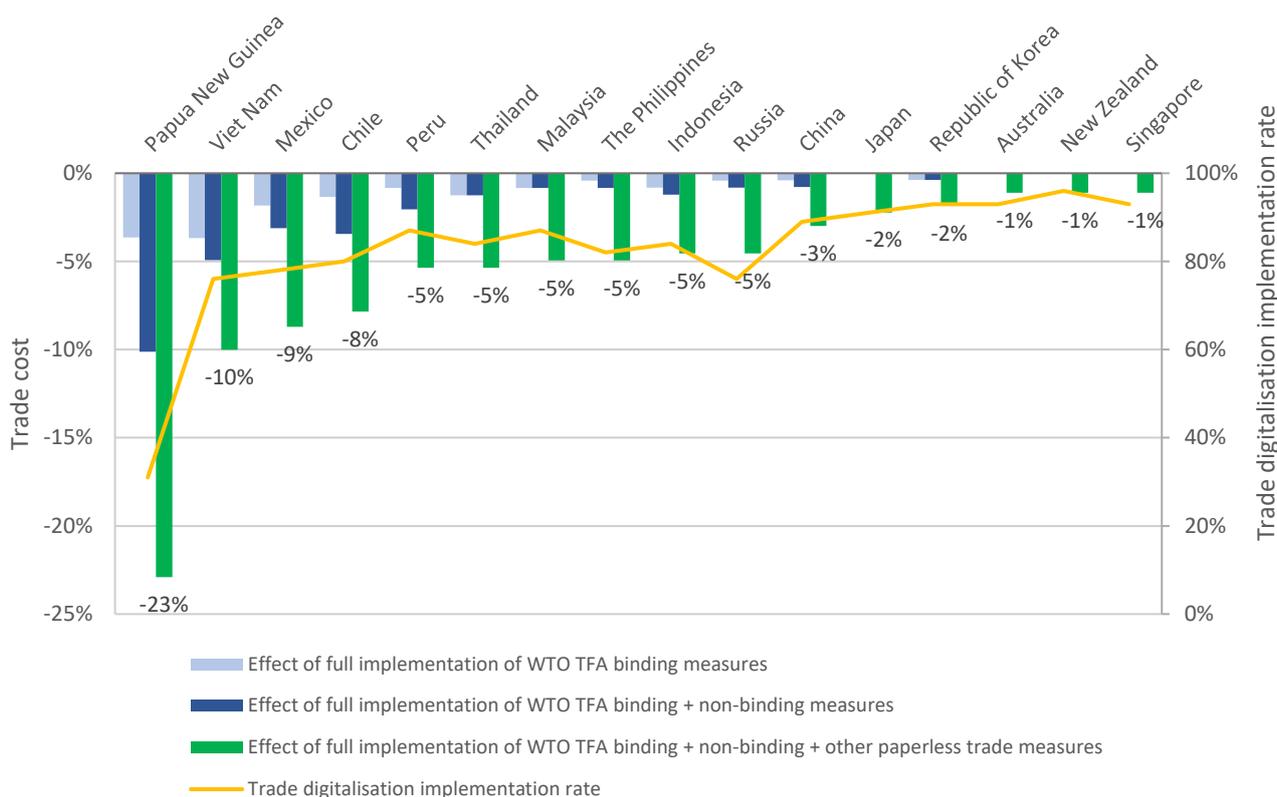


Figure 6. Potential trade cost reductions from trade facilitation and paperless trade across APEC economies

Note: TFA=Trade Facilitation Agreement; WTO (World Trade Organization). Scores were not available for Brunei Darussalam; Canada; Hong Kong, China; Chinese Taipei; and the United States. Source: ESCAP calculations based on UNTF 2025 data.

Translating trade facilitation priorities into action: Key APEC initiatives

The preceding analysis highlights APEC economies’ notable performance in core and digital trade facilitation, alongside emerging gaps in cross-border interoperability and sustainable and green trade facilitation. Within APEC, these priorities are not addressed in isolation. They are reflected in, and reinforced by, a set of APEC-wide initiatives that provide strategic direction, implementation guidance, and platforms for cooperation.

This section illustrates how three key APEC initiatives – the Connectivity Blueprint, the Supply Chain Connectivity Framework Action Plan III (SCFAP III) and the APEC List of Environmental Goods – collectively

support the region’s trade facilitation, digitalisation and sustainability objectives.

APEC Connectivity Blueprint (2015–2025)

At the strategic level, the APEC Connectivity Blueprint provides the overarching framework that aligns trade facilitation reforms with broader connectivity objectives, particularly through its emphasis on institutional connectivity.¹⁷ By structuring connectivity around physical, institutional and people-to-people dimensions, the Blueprint situates trade facilitation non-exclusively within the institutional connectivity pillar, where regulatory coherence, transparency, supply chain performance, and border agency modernisation are central. Its emphasis on infrastructure development and digital connectivity directly supports digital trade facilitation measures.

¹⁷ APEC, “Annex D: APEC Connectivity Blueprint for 2015–2025,” 2014, <https://www.apec.org/docs/default-source/LeadersDeclarations/2014/AnnexD.pdf>

In an effort to enhance the implementation of Blueprint, an APEC Policy Support Unit (PSU) report finds that while APEC economies are increasingly digitally connected, issues with interoperability, data governance and inclusion still hinder seamless connectivity.¹⁸ The study notes that digitalisation can greatly improve productivity and trade if bottlenecks like skills gaps, digital divides and insecure cross-border data flows are addressed. It calls for enhanced regulatory cooperation, harmonised standards, trust frameworks and strong public–private partnerships to build high-quality digital infrastructure. The report also stresses that integrating digital and green connectivity through inclusive broadband expansion, data-driven infrastructure, and capacity building will support both efficiency and sustainability in trade facilitation.

APEC Supply Chain Connectivity Framework Action Plan (SCFAP III, 2022–2026)

While the Connectivity Blueprint sets the strategic direction, the third phase of the SCFAP (SCFAP III) operationalises the objectives of the Blueprint by targeting concrete supply-chain bottlenecks that impede the efficient movement of goods across borders by embedding digitalisation, sustainability and resilience across APEC's supply chain agenda.

SCFAP III (2022–2026) aims to strengthen regional supply-chain performance and resilience by addressing five major chokepoints that hinder seamless trade: (1) inefficient digitalisation of end-to-end supply chains; (2) inadequate infrastructure development; (3) insufficient cooperation on data flows and cross-border payments; (4) lack of understanding on green supply-chain management; and (5) limited support for micro, small, and medium enterprise (MSME) participation in GVCs. Each chokepoint reflects cross-cutting constraints that impede the region's ability to achieve more efficient, sustainable and inclusive connectivity.¹⁹

A mid-term review of SCFAP III highlights steady progress in advancing digitalisation, interoperability and resilience across APEC supply chains.²⁰ Between 2021 and 2023, the region saw improvements in paperless trade facilitation – particularly in the electronic exchange of customs declarations and payment systems.

Infrastructure indicators also point to resilience, with faster broadband speeds, expanded port throughput and stronger liner connectivity, demonstrating recovery in multimodal logistics networks. However, challenges remain in the full digitalisation of border procedures, such as the electronic exchange of SPS certificates, as well as in bridging disparities in connectivity and legal frameworks governing cross-border data flows.

The review further underscores the need to deepen cooperation in emerging areas such as green and inclusive supply chains. While sustainability reporting and renewable-energy use are increasing, APEC still faces setbacks in reducing GHG emissions and natural-resource depletion. MSME integration into global supply chains remains uneven, reflecting declines in access to single windows and in participation in national trade facilitation committees. Policy practices identified in the report – such as developing interoperable single windows, digitalising ports and logistics, promoting the BCG model and expanding MSME-friendly AEO programmes – illustrate how digital and sustainable connectivity can jointly drive efficiency, inclusiveness and environmental responsibility in APEC's trade facilitation agenda.

Some policy practices implemented by APEC economies under the SCFAP are as follows²¹:

a. Fostering interoperability

Hong Kong, China's Trade Single Window (TSW) and Indonesia's Customs and Excise Information System and Automation (CEISA) are integrated with various government agencies, port systems and potentially other economies' single windows to streamline operational procedures. Singapore's TradeTrust connects businesses and governments for the interoperability of electronic documents across platforms.

b. Upgrading government systems

Indonesia's National Logistics Ecosystem and CEISA aim to optimise logistics operations by deploying advanced information technology (IT) systems and automating customs services, harmonising the flow of goods, documentation and electronic data exchange, and fostering improved collaboration within a unified ecosystem.

¹⁸ A. Bayhaqi et al., "Enhancing Implementation of APEC Connectivity Blueprint in the Digital Era: Digital Connectivity for Stronger Recovery" (APEC, 2022), <https://www.apec.org/publications/2022/03/enhancing-implementation-of-apec-connectivity-blueprint-in-the-digital-era-digital-connectivity-for-stronger-recovery>

¹⁹ A. Bayhaqi and T. Q. Nguyen, "Measuring Progress on the Supply Chain Connectivity Framework Action Plan (SCFAP III) 2022–2026: Indicators and Policy Practices" (APEC, 2023), https://www.apec.org/docs/default-source/publications/2023/9/223_psu_scfap-iii.pdf

²⁰ A. Bayhaqi, T. Q. Nguyen, and J. Lee, "APEC Supply Chain Connectivity Framework Action Plan 2022–2026 (SCFAP III): Mid-term Review" (APEC, 2024), https://www.apec.org/docs/default-source/publications/2024/11/224_psu_scfap-iii-mid-term-review.pdf?sfvrsn=d4fd796b_1

²¹ Bayhaqi, "APEC Supply Chain Connectivity Framework Action Plan 2022–2026 (SCFAP III): Mid-term Review."

c. Promoting innovation and digital readiness

Hong Kong, China demonstrates its commitment to innovation through the application of artificial intelligence (AI) and video analytics to enhance security in public cargo working areas as well as through the use of blockchain technology for the electronic issuance and verification of select licences and certificates.

d. Strengthening cooperation while utilising emerging technologies

Peru has assessed the potential benefits of implementing an electronic bill of lading to facilitate information transmission and accelerate customs procedures. Collaborative examples such as the Singapore–China and Singapore–Netherlands track-and-trace systems illustrate how technology is being leveraged to promote international cooperation while maintaining digital trust and security.

e. Promoting green and sustainable supply chain management

Hong Kong, China has developed a comprehensive green procurement list outlining sustainable specifications for products and services, such that both the public and private sectors may procure goods with sustainability in mind.

f. Empowering MSME participation in green supply chains

Chinese Taipei's Industry Mutual Assistance System employs a 'big enterprises first, small enterprises later' approach, guiding smaller companies through partnerships with industry leaders and public–private alliances toward net-zero goals.

g. Driving sustainable practices through environmental, social and governance (ESG) integration

Japan's decarbonisation projects promote ESG alignment across the value chain by developing guidebooks for engaging business partners in carbon reduction efforts. Chinese Taipei's transition roadmap for manufacturing targets equipment upgrades, energy conversion and circular economy practices, in pursuit of net-zero goals.

By concentrating on practical constraints faced by traders and logistics operators, SCFAP III helps bridge the gap between high-level commitments and on-the-

ground implementation, reinforcing the transition from domestic digitalisation to regionally connected supply chains with added emphasis on sustainable practices.

APEC environmental goods and sustainable trade facilitation

Beyond efficiency and resilience, APEC initiatives increasingly seek to also support addressing environmental issues through trade policy. The APEC List of Environmental Goods exemplifies this approach by combining tariff liberalisation with facilitative measures that support trade in climate- and environment-related goods, reinforcing the emerging but still under-implemented 'green trade facilitation' measures identified in the UNTF.

The APEC List of Environmental Goods, endorsed by APEC Leaders in 2012, represents a regional initiative linking trade liberalisation with environmental sustainability. Under this commitment, APEC economies agreed to reduce to 5 percent or less the tariffs applied on a list of 54 environmental goods by the end of 2015. These include products related to renewable energy generation, pollution control, waste management and environmental monitoring.²²

Beyond trade gains, the List underpins broader sustainability goals. Greater access to environmental goods promotes cleaner production, renewable energy use, and improved waste and water management, supporting the BCG economy model. However, trade in environmental goods alone is not sufficient to drive economy-wide green growth. Complementary policies such as innovation incentives, environmental regulations and sustainable finance mechanisms are equally essential.²³

Recognising the need to reflect technological advances and innovations, the APEC Ministers Responsible for Trade in 2021 affirmed readiness to build on the List's legacy, furthering APEC's contribution to addressing the most serious environmental challenges.²⁴ The Scoping Study on New and Emerging Environmental Goods delivered by the APEC Market Access Group recommends adopting a renewable energy and value-chain focus, extending coverage to items such as fuel-cell vehicles, critical minerals, green hydrogen and related components.²⁵ This approach would benefit both advanced and developing economies, enabling

²² C. Kuriyama, "A Review of the APEC List of Environmental Goods," APEC Policy Brief 41, 2021, <https://www.apec.org/publications/2021/10/a-review-of-the-apec-list-of-environmental-goods>

²³ Kuriyama, "A Review of the APEC List of Environmental Goods."

²⁴ "APEC Ministers Responsible for Trade Meeting Joint Statement 2021," APEC, 5 June 2011, https://www.apec.org/meeting-papers/sectoral-ministerial-meetings/trade/2021_mrt

²⁵ APEC Market Access Group, "Scoping Study on New and Emerging Environmental Goods" (APEC, 2021) https://www.apec.org/docs/default-source/publications/2021/12/scoping-study-on-new-and-emerging-environmental-goods/221_mag_scoping-study-on-new-and-emerging-environmental-goods.pdf?sfvrsn=ad6a66a5_2

participation across the value chain, from raw materials to high-tech assemblies.

The study highlights the need for a regularly updated, non-exhaustive List of Environmental Goods to keep pace with clean tech innovation. Broader liberalisation of environmental goods and transparent regulation could lower costs, boost green investment and help APEC economies to position themselves within global clean-tech supply chains.

Taken together, the three initiatives discussed in this section illustrate how APEC has progressively translated trade facilitation priorities into regional actions. The Connectivity Blueprint provides strategic coherence, the SCFAP III delivers implementation-focused policies, and the List integrates sustainability considerations into the trade facilitation agenda.

This integrated approach also highlights the importance of sequencing reforms: foundational trade facilitation enables digitalisation; digitalisation supports cross-border interoperability; and interoperable digital systems create the conditions for credible and scalable green trade facilitation. Equally vital is the development of robust infrastructure – both physical and digital – which serves as the backbone for these reforms.

Conclusion and way forward

APEC's steady progress in advancing trade facilitation and digitalisation demonstrates the region's commitment to building more efficient, transparent and sustainable trade systems. Sustaining this momentum requires continued policy innovation and stronger cross-border coherence. While global supply chains hold immense potential as levers for sustainability, achieving this requires systemic transformation and clear policy signals that promote sustainable production and consumption patterns.²⁶

Digital trade facilitation offers one of the most effective pathways toward this transformation. By embedding sustainability and traceability features into paperless and interoperable trade systems, APEC economies can ensure that efficiency gains are accompanied by measurable environmental and social benefits. With global policy frameworks rapidly shifting, from voluntary initiatives to more binding due diligence and disclosure requirements, sustainable trade and investment are increasingly at the centre of global policy dialogues.²⁷ This aligns with APEC's own efforts to integrate digital transformation with credible environmental reporting, circular economy practices and inclusive supply chain participation.

At the same time, trade facilitation innovation and regulatory coherence will be essential to ensure that emerging sustainability measures do not fragment markets or impose uneven compliance burdens on businesses. APEC's collaborative frameworks can play a leading role by harmonising digital standards, promoting mutual recognition of electronic certificates and supporting the alignment of sustainability-related regulations across member economies. Where available, the frameworks should build upon and feed into related multilateral initiatives by the WTO and the UN to maximise impact – including the framework agreement on paperless trade and the regional digital trade integration initiative at ESCAP.

Sustainability is now a key factor in business competitiveness and long-term resilience. APEC's leadership in this area enables the region to establish new global standards for transparent, resilient and environmentally responsible trade.

²⁶ K. Botwright and A. S. Verghese, "Supply Chain Sustainability Policies: State of Play," World Economic Forum, 10 May 2022, <https://www.weforum.org/publications/supply-chain-sustainability-policies-state-of-play/>

²⁷ Botwright and Verghese, "Supply Chain Sustainability Policies."

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The views expressed in this paper are those of the authors and do not represent those of the APEC Secretariat or the APEC Member Economies.

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APEC#226-SE-01.4
