



Asia-Pacific  
Economic Cooperation

APEC POLICY SUPPORT UNIT  
POLICY BRIEF No. 59 (March 2024)

# Digitalising Trade: The Role of Paperless Platforms

By Andre Wirjo, Akhmad Bayhaqi and Ee Ting Oh

## KEY MESSAGES

- Technological advancements notwithstanding, the trade process remains largely a manual and time-consuming one, with significant costs to businesses and consumers.
- Notably, APEC economies have continued to make strides on digitalising various trade procedures. At the same time, there has been a significant rise in private digital trade platforms (which vary in geographic reach, services offered and technology employed). The COVID-19 pandemic has only reinvigorated these digitalisation efforts by both the public and private sector.
- Although the increasing use of digital tools and the proliferation of digital trade platforms represent progress in the right direction, there are at least four issues holding back the wider adoption of trade digitalisation: (1) acceptance and enforceability of electronic documents; (2) interoperability and standards; (3) commercial viability; and (4) digital skills and infrastructure.
- Promoting the adoption of digital tools, and in particular, digital trade platforms, requires more efforts in: (1) advancing legal recognition of electronic documents; (2) improving standards and interoperability; (3) enhancing the commercial viability of trade platforms; and (4) identifying and addressing gaps holistically.
- International and regional organisations such as APEC and the Asian Development Bank (ADB) play a critical role in advancing these efforts by providing the avenue to share information, undertake capacity-building activities, and explore cross-fora collaboration.

## Introduction

International trade is a key contributor to economic growth in many economies. Studies have demonstrated that pursuing export-oriented strategies<sup>1</sup> can lead to rapid increases in incomes and living standards.<sup>2</sup> Specifically, in the context of APEC, its share of world trade has risen since 2008, stabilising in recent years at around the 47 percent level seen in 2022. In fact, APEC's trade in 2022 reached historic highs of USD 14.98 trillion in exports and USD 15.08 trillion in imports.<sup>3</sup> Between 2008 and 2022, APEC's GDP grew at an annual compounded rate of 4.5 percent, outpacing the world (3.3 percent).<sup>4</sup>

International trade stakeholders have developed time-tested mechanisms such as letters of credit (LCs),<sup>5</sup> escrow services<sup>6</sup> and trade credit instruments<sup>7</sup> to ensure that any commercial transaction proceeds smoothly with no or minimal risks. The advent of digitalisation has enabled trade processes to be simplified and improved significantly. For example, more economies are adopting electronic customs systems to replace physical documents that had to be submitted in person. Digital transformation has also allowed logistics providers to track shipments in real time, hence better synchronising trade processes. Digital trade platforms have also been developed to further facilitate trade.

This policy brief examines the current state of digital trade facilitation with a focus on the role that digital trade platforms play. It identifies the challenges that hinder the wider adoption of such systems and provides recommendations to overcome key barriers.

## State of play

### Why digital trade facilitation?

A single international trade transaction could require the interaction of more than 20 entities and involve between 10 to 20 paper documents.<sup>8</sup> Take the bill of lading (BL), for instance. This is typically issued by an ocean carrier upon the vessel's departure from the port of origin. The shipper endorses the BL. The BL is sent to the importer, who must then present it to the carrier at the destination port to release the goods. Besides facilitating goods release, the BL serves vital roles in processes such as customs clearance, payment claims, and aiding negotiations in intricate cross-border shipments.<sup>9</sup>

Despite technological advancements, cross-border trade remains largely a manual and time-consuming process. Paper-based documents are still widely used in exchanges between different parties, with as much as 75 percent of the same information being rekeyed on different documents. Besides being highly inefficient, manual entries often lead to larger margins of error that can lead to further discrepancies and delays. Indeed, a delay in the arrival of a BL can significantly hold back the issuance of other documents like LCs and customs clearance, disrupting the entire supply chain. Small inefficiencies in every transaction add up and the overall deadweight losses could amount to up to 30 percent of global trade logistics.<sup>10</sup> Paper documents are also easy to fabricate, with paper trails hampering transparency and the ability of institutions to crack down on fraud in trade finance.

<sup>1</sup> International Monetary Fund (IMF), "Global Trade Liberalization and the Developing Countries – An IMF Issues Brief," 2001, <https://www.imf.org/external/np/exr/ib/2001/110801.htm>

<sup>2</sup> J.A. Frankel and D.H. Romer, "Does Trade Cause Growth?"

*American Economic Review* 89, no. 3 (1999), <https://doi.org/10.1257/aer.89.3.379>; F. Alcalá and A. Ciccone, "Trade and Productivity," *Quarterly Journal of Economics* 119, no. 2 (2004), <https://doi.org/10.1162/0033553041382139>

<sup>3</sup> World Trade Organization (WTO), "WTO Stats," accessed 28 July 2023, <https://stats.wto.org/>. Estimates for APEC trade and world trade exclude Hong Kong, China due to the lack of data on commercial services trade in 2022.

<sup>4</sup> APEC, "StatsAPEC," accessed 8 January 2024, <https://statistics.apec.org/>

<sup>5</sup> S. Parekh, "Letter of Credit – Meaning, Process & Role in International Trade," Drip Capital (blog), 31 August 2022, <https://www.dripcapital.com/resources/blog/letter-of-credit-lc>

<sup>6</sup> A.K. Sokol, "How Are Escrow Services Used in International Trade Transactions?" Tradeology (blog), 25 September 2013, <https://blog.trade.gov/2013/09/25/how-are-escrow-services-used-in-international-trade-transactions/>

<sup>7</sup> ACCA, "Trade Credit," accessed 10 August 2023, <https://www.accaglobal.com/gb/en/business-finance/types-finance/trade-credit.html>

<sup>8</sup> S. Ramachandran et al., "Digital Ecosystems in Trade Finance: Seeing Beyond the Technology" (Boston Consulting Group, 2019), [https://web-assets.bcg.com/img-src/BCG\\_Digital\\_Ecosystems\\_in\\_Trade\\_Finance\\_tcm9-229964.pdf](https://web-assets.bcg.com/img-src/BCG_Digital_Ecosystems_in_Trade_Finance_tcm9-229964.pdf)

<sup>9</sup> M. Poverello, "What Is a Bill of Lading and Why Isn't a Digital Format Industry Standard? What Happened to the Portcullis? (blog), 14 April 2020, <https://mpoverello.com/2020/04/14/what-is-a-bill-of-lading-and-why-isnt-a-digital-format-industry-standard/>

<sup>10</sup> K. Suominen, "Fast-Tracking Blockchain Use for Interoperable and Inclusive Trade," Hinrich Foundation, 11 May 2022, <https://www.hinrichfoundation.com/research/wp/tech/fast-tracking-blockchain-interoperable-inclusive-trade/>

Digital trade facilitation is a potential solution to these challenges. One study estimates that APEC economies may stand to gain between NZD 9 to 18 billion (USD 5.6 to 11.2 billion) from facilitating trade digitally.<sup>11</sup> By digitalising and automating trade, information could be accurately and readily accessed by different stakeholders. Removing the need to wait for signed paper copies cuts turnaround time for document processing.

Moreover, automation can increase efficiency by replicating data fields, further reducing time and costs. Digitalisation also facilitates data sharing by banks and other institutions so that they could better undertake their due diligence, verify the authenticity of documents and prevent fraud.<sup>12</sup>

Additionally, digitalisation could generate positive spillover effects, including raising productivity by diverting human resources to higher value-adding activities, making it easier for firms – particularly micro, small and medium enterprises (MSMEs) – to expand and deepen their participation in trade,<sup>13</sup> and allowing stakeholders to make better business decisions and collaborate more effectively via data generated at lower costs. While some aspects of digitalising trade facilitation may be more complex (e.g., port digitalisation), such advantages could already be enjoyed with those that are relatively easier to implement, such as electronic clearing of documents and establishing trade information portals.<sup>14</sup>

## Developments in digitalising trade

Even prior to the COVID-19 pandemic, the adoption of digital technologies has started to transform trade processes. Table 1 provides examples of how they are used in APEC economies to lower trade costs and accelerate trade compliance.

Indeed, APEC economies have continued to make progress on digitalising various trade procedures over

the years, as shown by the UN Global Survey on Digital and Sustainable Trade Facilitation. A total of 14 APEC economies have fully implemented electronic single window (SW) systems, which allow parties involved in trade and transport to lodge standardised information and documents at a single entry point to fulfil all import, export and transit-related regulatory requirements. In ASEAN, the exchange of electronic certificates of origin (e-Form D) through the ASEAN SW has saved approximately 6 million days of business operation, leading to a cost saving of USD 150 million.<sup>15</sup>

While the primary purpose of SWs is to simplify information flows between trade parties and the government, more specifically in facilitating customs declaration, they have been augmented over time to support e-payments, logistics, insurance and data insights, among others.<sup>16</sup> In the context of ports, as of 1 January 2024, it is mandatory for global ports to implement maritime single windows (MSWs) for the electronic exchange of information necessary for ship arrival, stay and departure,<sup>17</sup> marking a significant stride in accelerating digitalisation in shipping. It is worthwhile to note that, globally, there exists a diversity of SW systems, as each economy tends to design the system to fit its specific local context and regulatory requirements.

There has also been a significant rise in private digital trade platforms. These vary in geographic reach, services offered and technology employed.<sup>18</sup> Global platforms like WaveBL and ICE Digital Trade (formerly essDOCS) operate across multiple continents; domestic platforms like TradeWaltz (Japan) and Trusple (China) serve mainly local clientele, although some have plans to expand their services abroad.<sup>19</sup> Several domestic platforms have established links to the public sector (e.g., TradeWaltz and Singapore's NDTP) and some are fully privately owned (e.g., Trusple).

Trade platforms could serve a range of core functions, such as trade finance, shipping and logistics,

<sup>11</sup> USD equivalent is based on the exchange rate on 12 January 2024. See C. Nixon, "Digital Trade Is the Way Forward for New Zealand: A Preliminary Assessment of the Costs and Benefits of Digital Trade" (New Zealand Institute of Economic Research (NZIER), 2021), [https://www.nzier.org.nz/hubfs/Public%20Publications/Client%20reports/nzier\\_report\\_-\\_digital\\_trade\\_is\\_the\\_way\\_forward\\_for\\_new\\_zealand.pdf](https://www.nzier.org.nz/hubfs/Public%20Publications/Client%20reports/nzier_report_-_digital_trade_is_the_way_forward_for_new_zealand.pdf)

<sup>12</sup> J. Basquill, "ICC UK Urges Action on Digitisation in 'Wake-up Call' over Fraud," *Global Trade Review (GTR)*, 19 October 2022, <https://www.gtreview.com/news/global/icc-urges-action-on-digitisation-in-wake-up-call-over-fraud/>

<sup>13</sup> Y. Duval and M. Kong, "Digital Trade Facilitation: Paperless Trade in Regional Trade Agreements," ADBI Working Paper 747, Asian Development Bank Institute (ADBI), Tokyo, 2017, <https://www.adb.org/sites/default/files/publication/321851/adbi-wp747.pdf>

<sup>14</sup> Please refer to Table 1 for examples. For additional discussion on stages of trade digitisation, see: Citizen of the Future, "The Evolution of Trade Digitization: Navigating the Four Stages," 22 December 2023, <https://www.futurecitizen.news/article/the-evolution-of-trade-digitization-navigating-the-four-stages>

<sup>15</sup> Association of Southeast Asian Nations (ASEAN), "Sixth Symposium of the ASEAN Single Window," 4 April 2023, <https://asean.org/sixth-symposium-of-the-asean-single-window/>

<sup>16</sup> A. Bayhaqi and S.K. Singh, "Study on Single Window Systems' International Interoperability: Key Issues for Its Implementation" (Singapore: APEC Policy Support Unit, 2018), <https://www.apec.org/publications/2018/08/study-on-single-window-systems-international-interoperability>

<sup>17</sup> International Maritime Organization (IMO), "FAL 46 Amendments: Single Window for Ship Data Exchange to Become Mandatory," 23 May 2022, <https://www.imo.org/en/MediaCentre/PressBriefings/pages/FAL-46-amendments.aspx>

<sup>18</sup> S. Ramachandran et al., "Digital Ecosystems in Trade Finance."

<sup>19</sup> Domestic platforms do not refer to platforms that facilitate domestic trade. Domestic platforms help to facilitate cross-border trade through digitalisation of customs and other trade processes but the entities they interact with are mostly local stakeholders.

Digital approaches	Selected impacts in the APEC region
Digital single window	Mexico: The time needed to verify data from phytosanitary certificates has improved, from 2 weeks to just 30 minutes, hence reducing spoilage of perishable goods while waiting for clearance by the relevant authorities.
Digital trade documents, 'paperless trade'	Canada: The Canadian Border Services Agency (CBSA) e-Longroom allows clients to submit customs requests digitally, reducing the time from two days to just 30 minutes. Japan: The streamlining of port operations through Cyber Port enhances efficiency for 350 companies, enabling them to reduce time spent on logistics procedures by 60 percent. Korea: The acceptance of the digital bill of lading (eBL) cuts about three days from the processing time and saves approximately USD 250 in courier and related expenses.
Digital payments of customs duties and fees	Chinese Taipei: The CPT (Customs Port Trade) Single Window provides e-payment services where customs can electronically deduct fees and taxes from traders' accounts.
Online information on export and import processes	Viet Nam: The Viet Nam Trade Information Portal (VTIP), a web-based database, provides all regulatory information related to the facilitation of cross-border trade activities.
Port digitalisation	Chile: Container terminals operated by a Danish company in San Antonio and Santiago use drones to monitor loading and unloading operations, traffic flows, container stack efficiency, and compliance to safety rules. Singapore: The Maritime and Port Authority of Singapore (MPA) offers digitalOCEANS™, a global digital platform that facilitates data exchange interoperability and end-to-end services for port calls and marine services.

**Table 1. Impacts of digital technologies in border and trade processes**

Source: APEC, "Compendium of Best Practice Technology Solutions for Single Window Interoperability" (Singapore: APEC, November 2019), [https://www.apec.org/docs/default-source/publications/2019/11/compendium-of-best-practice-technology-solutions-for-single-window-interoperability/219\\_cti\\_compendium-of-best-practice-technology-solutions-for-single-window-interoperability.pdf?sfvrsn=8441ba93\\_1](https://www.apec.org/docs/default-source/publications/2019/11/compendium-of-best-practice-technology-solutions-for-single-window-interoperability/219_cti_compendium-of-best-practice-technology-solutions-for-single-window-interoperability.pdf?sfvrsn=8441ba93_1); APEC Committee on Trade and Investment (CTI), "Utilizing Digital Technology in the Field of Trade Facilitation under the Current COVID-19 Pandemic and Beyond (Phase-II): Best-Practices Sharing Workshops" (Singapore: APEC, 2023), [https://www.apec.org/docs/default-source/publications/2023/4/utilizing-digital-tech-in-the-field-of-trade-facilitation-\(phase-ii\)/223\\_cti\\_utilizing-digital-tech-in-the-field-of-trade-facilitation-\(phase-ii\).pdf?sfvrsn=871bc566\\_2](https://www.apec.org/docs/default-source/publications/2023/4/utilizing-digital-tech-in-the-field-of-trade-facilitation-(phase-ii)/223_cti_utilizing-digital-tech-in-the-field-of-trade-facilitation-(phase-ii).pdf?sfvrsn=871bc566_2); I.M. Rivas and M. Maday, "How the Pacific Alliance Linked Up Its Single Windows for Foreign Trade," IDB Blogs, 8 August 2019, <https://blogs.iadb.org/integration-trade/en/pacific-alliance-single-windows-trade/>; World Bank, "Vietnam: Deepening International Integration and Implementing the EVFTA" (Washington, DC: World Bank, 2020), <https://documents1.worldbank.org/curated/en/866871589557725251/pdf/Vietnam-Deepening-International-Integration-and-Implementing-the-EVFTA.pdf>; World Economic Forum (WEF), "Windows of Opportunity: Facilitating Trade with Blockchain Technology" (Geneva: WEF, 2019), [https://www3.weforum.org/docs/WEF\\_Windows\\_of\\_Opportunity.pdf](https://www3.weforum.org/docs/WEF_Windows_of_Opportunity.pdf)

digitalisation of trade documents and/or provision of value-added services (e.g., insurance services and marketplace services). They can serve as one-stop shops integrating various trade processes. In fact, some platform providers engage multiple partners and suppliers to provide services on their platforms, forming extensive trade networks and increasing the value of their offerings. For example, ICE CargoDocs has been integrated into various platforms, enabling users to access ICE CargoDocs alongside other solutions.<sup>20</sup> Technology-wise, blockchain has become the technology of choice among many platform providers as its perceived immutability enhances trust, a critical quality for trade transactions.<sup>21</sup>

The COVID-19 pandemic, which significantly disrupted supply chains, has led to further calls for digitalisation. Among the key lessons that the pandemic highlighted

for customs authorities are: (1) the significance of automation and digitisation in reducing paperwork and human intervention by strengthening customs management systems and through platforms like SWs; (2) the value of adopting transformative technologies (e.g., artificial intelligence (AI), blockchain, big data) to streamline customs procedures; and (3) the benefits of cross-border cooperation (including harmonisation and data exchange) in promoting collaboration, compliance, trade facilitation and regional integration.<sup>22</sup>

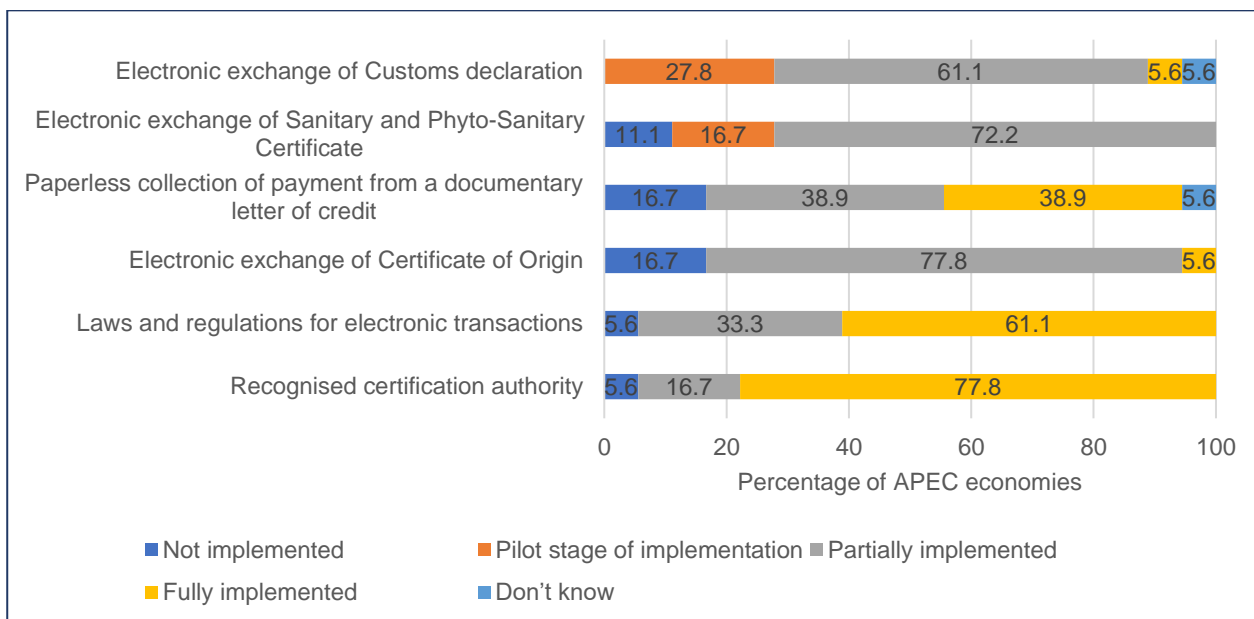
One anecdotal evidence of the reinvigorated global commitment to accelerate the use of digital tools to facilitate trade is the doubling of the membership of the Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific (CPTA) to 13 between 2021 and 2022.<sup>23</sup> Meanwhile, nine major ocean carriers have committed to '100% adoption of an

<sup>20</sup> ICE Digital Trade, "ICE Digital Trade Solution Partners," accessed 30 January 2024, <https://www.essdocs.com/network/partners>

<sup>21</sup> E. Ganne, "Can Blockchain Revolutionize International Trade?" (Geneva: World Trade Organization, 2018), [https://www.wto.org/english/res\\_e/publications\\_e/blockchainrev18\\_e.htm](https://www.wto.org/english/res_e/publications_e/blockchainrev18_e.htm)

<sup>22</sup> S. Corcuera-Santamaria and J.M.G. Sanjinés, "The Resilience and Transformation of Customs Authorities during COVID-19," IDB Blogs, 22 June 2020, <https://blogs.iadb.org/integration-trade/en/customs-authorities-covid-19/>

<sup>23</sup> UN Treaty Collection, "Framework Agreement on Facilitation of Cross-Border Paperless Trade in Asia and the Pacific," 19 May 2016, [https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg\\_no=X-20&chapter=10&clang=\\_en](https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=X-20&chapter=10&clang=_en)



**Figure 1. APEC implementation of cross-border paperless trade measures, 2023**

Source: 2023 UN Global Survey on Digital and Sustainable Trade Facilitation. See “Trade Facilitation & Paperless Trade Visualisation,” UN Global Survey on Digital and Sustainable Trade Facilitation, June 2023, accessed 21 December 2023, [https://www.untfsurvey.org/?\\_gl=1\\*1keg4zz\\*\\_ga\\*MTM3MjQwMDI4My4xNjg4NTQyMTgx\\*\\_ga\\_SB1ZX36Y86\\*MTY4OTMyNTE2Mi4xOS4wLjE2ODkzMjUxNjUuNjAuMC4w\\*\\_ga\\_950653T1WV\\*MTY4OTMyNTE2Mi4zLjAuMTY4OTMyNTE2Mi42MC4wLjA](https://www.untfsurvey.org/?_gl=1*1keg4zz*_ga*MTM3MjQwMDI4My4xNjg4NTQyMTgx*_ga_SB1ZX36Y86*MTY4OTMyNTE2Mi4xOS4wLjE2ODkzMjUxNjUuNjAuMC4w*_ga_950653T1WV*MTY4OTMyNTE2Mi4zLjAuMTY4OTMyNTE2Mi42MC4wLjA)

electronic bill of lading (eBL) based on DCSA [Digital Container Shipping Association] standards by 2030<sup>24</sup>. There has also been a significant attempt to produce and align global standards and promote interoperability. The World Trade Organization (WTO) and the International Chamber of Commerce (ICC), for instance, have jointly published the Standards Toolkit for Cross-Border Paperless Trade to provide an overview of existing standards that can help drive adoption and promote interoperability.<sup>25</sup> The ICC Digital Standard Initiative (DSI) has created the Industry Advisory Board to bring together global stakeholders in the trade ecosystem to ensure the harmonisation of standards for trade documents. As of November 2023, DSI has published two sets of analyses and recommendations of digital standards concerning key trade documents and data elements, with the anticipated release of the third and final set in 1Q 2024.<sup>26</sup>

<sup>24</sup> Digital Container Shipping Association (DCSA), “DCSA’s Member Carriers Commit to a Fully Standardised, Electronic Bill of Lading by 2030,” 15 February 2023, <https://dcsa.org/newsroom/dcsas-member-carriers-commit-to-a-fully-standardised-electronic-bill-of-lading-by-2030>  
<sup>25</sup> E. Ganne and H. Nguyen, “Standards Toolkit for Cross-Border Paperless Trade: Accelerating Trade Digitalisation through the Use of Standards” (Paris: International Chamber of Commerce (ICC), 2022), [https://www.wto.org/english/res\\_e/booksp\\_e/standtoolkit22\\_e.pdf](https://www.wto.org/english/res_e/booksp_e/standtoolkit22_e.pdf)

## Issues affecting wider adoption of digital trade platforms

Although the increasing use of digital tools and the proliferation of digital trade platforms are steps in the right direction, available data suggest that further efforts are required. The 2023 UN Global Survey on Digital and Sustainable Trade Facilitation which covers 18 APEC economies indicates that most APEC economies have only partially implemented the electronic exchange of customs declarations, certificates of origin and sanitary and phyto-sanitary certificates that are required for cross-border shipments (Figure 1).<sup>27</sup>

<sup>26</sup> ICC Digital Standard Initiative (DSI), “Key Trade Documents and Data Elements: Digital Standards Analysis and Recommendations” (ICC, 2023), [https://www.dsi.iccwbo.org/\\_files/ugd/8e49a6\\_530a1bd71a7e481f8485f4772a6854d5.pdf](https://www.dsi.iccwbo.org/_files/ugd/8e49a6_530a1bd71a7e481f8485f4772a6854d5.pdf)

<sup>27</sup> In the survey, a measure is considered partially implemented if one of the following five conditions is true: (1) the measure is in partial compliance with commonly accepted international standards, recommendations and conventions; (2) the economy is still in the process of rolling out its implementation; (3) the measure is already being used but mostly on unsustainable, short-term and/or ad hoc basis; (4) measures are implemented only in some of the targeted locations; (5) it involves only some of the targeted stakeholders.

Additionally, 17 percent of APEC economies have not implemented the paperless collection of payment from a documentary LC or the electronic exchange of certificates of origin. Uptake of digital trade platforms and associated services could also be improved, with only 1.2 percent of the BLs issued being electronic in 2021 despite eBLs coming into existence in the 1990s.<sup>28</sup>

While technologies such as blockchain show promise, in 2022, at least five key blockchain projects, including we.trade and TradeLens, failed.<sup>29</sup> High costs, challenges in building networks of services providers and users, regulation, and lack of integration with existing infrastructure have been identified as possible contributors to their collapse.<sup>30</sup>

The following sub-sections elaborate on four factors that could be holding back the adoption of trade digitalisation, namely: acceptance and enforceability of electronic documents; interoperability and standards; commercial viability; and digital skills and infrastructure.

## Acceptance and enforceability of electronic documents

While some progress has been made in facilitating paperless trade, most documents are still required to be issued in paper form, including those collectively referred to as transferable records/documents (e.g., BLs, bills of exchange, and warehouse receipts).<sup>31</sup> The Model Law on Electronic Transferable Records (MLETR) from the UN Commission on International Trade Law (UNCITRAL) provides an international framework for harmonising domestic laws to address this issue.

MLETR enables the legal use of the electronic version of these documents by recognising them as equivalent to their paper-based counterparts, that is, MLETR allows for a paper document to be replaced with its electronic version and vice versa as the needs of a transaction require. In practice, this means that an eBL originating from an economy that has passed MLETR (or equivalent legislation) could be converted back to

hard copy if the receiving economy does not recognise the electronic version.

While only seven economies have adopted MLETR as part of their domestic legislation, others, including Germany, the United Kingdom, and the United States, have passed, or are in the process of passing, compatible legislation. Irrespective of the positive momentum on legislation, paper-based instruments continue to be preferred over electronic ones, due to their long history. Physical BLs, for instance, date back to 1564,<sup>32</sup> and it can take time for practices on the ground to reflect the changing rules and regulations. For instance, customs brokers may prefer documents to be printed in hard copy or may favour retyping the required information into their customs declaration due to force of habit or fear of losing information due to technological glitches.<sup>33</sup>

## Interoperability and standards

Interoperability among digital trade platforms is critical to seamless communication between parties involved in the transactions. Platforms that work in isolation or could only facilitate communication between a small group of parties could be likened to 'digital islands' (that focus on specific micro sections of trade processes), with paper documents still needed to serve as a bridge to each island.<sup>34</sup>

At least two layers of interoperability are needed for platforms to communicate with one another: data interoperability and technical interoperability. Data is interoperable if information from one platform can be interpreted unambiguously by another platform. This would require platforms to agree on data definitions – such as whether a 'port of discharge' is equivalent to a 'port of unloading' – and common abbreviations – such as COD for 'cash on delivery' and OBL for 'original bill of lading'.<sup>35</sup> Ensuring common data structure in a trade document also adds another dimension to data interoperability.

<sup>28</sup> DCSA, "100% eBL by 2030," accessed 17 April 2023, <https://dcsa.org/100-percent-eb/>

<sup>29</sup> A. DiCaprio, "Five Lesson [sic] from 2022's Blockchain Failures," *Traders Magazine*, 26 January 2023, <https://www.tradersmagazine.com/am/five-lesson-from-2022s-blockchain-failures/>

<sup>30</sup> DiCaprio, "Five Lesson."

<sup>31</sup> The UN Commission on International Trade Law (UNCITRAL) defines them as 'documents or instruments that entitle the holder to claim the performance of the obligation indicated therein and that allow the transfer of the claim to that performance by transferring possession of the document or instrument'. See UNCITRAL, "UNCITRAL Model Law on Electronic Transferable Records (2017)," 13 July 2017, [https://uncitral.un.org/en/texts/ecommerce/modellaw/electronic\\_transferable\\_records](https://uncitral.un.org/en/texts/ecommerce/modellaw/electronic_transferable_records)

<sup>32</sup> C. Ward, "Electronic Bills of Lading: A Good Idea on Paper?" *WEST* (West P&I Waypoints Magazine), no. 1, 24–25, [https://www.westpandi.com/getattachment/95ae2336-edf0-4279-aab7-cc98df3823e4/west\\_waypoints\\_magazine\\_issue-01\\_under\\_attack\\_pdf.pdf](https://www.westpandi.com/getattachment/95ae2336-edf0-4279-aab7-cc98df3823e4/west_waypoints_magazine_issue-01_under_attack_pdf.pdf)

<sup>33</sup> B. Vanschoenwinkel, "The Invisible Paper Chain in Today's Customs Document Flow and How to Break It Using Artificial Intelligence," *WCO News* 102, no. 3, 18 October 2023, <https://mag.wcoomd.org/magazine/wco-news-102-issue-3-2023/the-invisible-paper-chain/>

<sup>34</sup> S. Ganesh et al., "Rebooting a Digital Solution to Trade Finance," Bain & Company, 21 October 2018, <https://www.bain.com/insights/rebooting-a-digital-solution-to-trade-finance/>

<sup>35</sup> "Common Shipping and Freight Abbreviations," Shipping and Freight Resource, accessed 11 August 2023, <https://shippingandfreightresource.com/wp-content/uploads/wp-post-to-pdf-cache/1/common-shipping-and-freight-abbreviations.pdf>

The other layer, technical interoperability, refers to platforms having compatible technology for connecting to one another and transferring data easily. Without a standardised approach, disparate platforms that wish to link with one another must do so bilaterally through multiple trials. Furthermore, the lack of a harmonised approach to global standards means that platforms are likely to create and adopt their own standards and rules, creating closed-loop networks instead of systems that can facilitate the exchange of information.<sup>36</sup> Indeed, according to the ICC and WTO, close to 100 standards and initiatives are used in international trade today.<sup>37</sup>

## Commercial viability

Despite more platform providers entering the fray, their long-term sustainability remains a challenge. Platforms could rack up exorbitant costs depending on the technology used. Blockchain technology, for example, comes at a high computational cost. Blockchain is also energy-intensive and involves many different protocols that make interoperability a huge challenge.<sup>38</sup> In reality, not all transactions require such a high level of security, and platforms need to assess if blockchain is needed for their purposes instead of hopping on the bandwagon.<sup>39</sup>

Also, the interoperability issues described earlier may have commercial impact on both the supply side and the demand side. From the perspective of services partners/suppliers such as banks, the closed-loop networks that are reflective of many digital trade platforms mean that they have to sign up with multiple platforms in order to offer their services.<sup>40</sup> Moreover, as each platform has its own technology and bylaws that govern the relationships between the parties involved, both suppliers and users will need to get their legal team to look through the platform's rulebook and train staff to use the platform. After weighing the benefits and costs of using these platforms, suppliers and users may decide not to participate. The combination of the high cost of running a platform and difficulties in attracting

sufficient partners/suppliers and users could lead to platform providers throwing in the towel.

Competition concerns could also contribute to partners/suppliers being hesitant about joining a platform and establishing a truly global supply-chain ecosystem. TradeLens, developed by ocean carrier Maersk (and IBM), failed as shippers and freight forwarders feared that Maersk would increase its dominance in the market, leading to less favourable pricing arrangements.<sup>41</sup> Rival carriers were also concerned about the risk that the platform would be used to gain access to previously unavailable commercial information.<sup>42</sup>

## Digital skills and infrastructure

Digital skills and infrastructure are critical to support the use of digital trade platforms. Internet of things (IoT) technology, for example, is used by platform providers like ICE Digital Trade to digitally monitor cargo and improve supply chain visibility.<sup>43</sup> Although the right digital capabilities are necessary to employ emerging technologies and fully capitalise on digital trade platforms, the 2022 Global Digital Skills Index by Salesforce, which surveyed more than 23,000 workers across 19 economies (including nine APEC economies), reveals that over three-quarters of respondents do not feel ready to operate in a digital-first world and less than 30 percent are actively involved in digital skills learning and training.<sup>44</sup>

Digital infrastructure too has not kept pace with the developments in digital trade platforms. With IoT devices expected to reach 30 billion by 2025, the demand for more reliable and faster connections is set to grow rapidly.<sup>45</sup> Broadband coverage and performance are key indicators of digital infrastructure and must be able to support the vast volumes of data exchange that underlie the digital platforms. These needs raise concerns over the impact of digital divides. In July 2023, the speed of fixed broadband connections in the APEC region varied from 16.2 Mbps (Papua New

<sup>36</sup> K. Suominen, "Trust in Trade: Challenges to the Global Convergence on Digital Standards," Hinrich Foundation, 28 March 2023, <https://www.hinrichfoundation.com/research/wp/digital/global-race-to-converge-on-digital-standards/>

<sup>37</sup> D. Patel, "Standards for Digital Trade Exist, Lack of Awareness Is the Problem," *Trade Finance Global*, 22 March 2022, modified 7 February 2024, <https://www.tradefinanceglobal.com/posts/standards-for-digital-trade-exist-lack-of-awareness-is-the-problem-a-deep-dive-into-icc-dsi-and-wtos-standards-toolkit/>

<sup>38</sup> R. Sarathy, "It's Time to Take Another Look at Blockchain," interviewed by T. Kinni, *MIT Sloan Management Review* 64, no. 2 (Winter 2023): 1–5.

<sup>39</sup> UN Centre for Trade Facilitation and Electronic Business, "Blockchain in Trade Facilitation," UN Economic Commission for Europe (UNECE), Geneva, 2020, <https://unece.org/info/Trade/CEFACT/pub/21826>

<sup>40</sup> H. Nguyen, "Trade Digitization on a Global Scale: How Far Are We?" *WCO News*, 24 February 2022, <https://mag.wcoomd.org/magazine/wco-news-97-issue-1-2022/trade-digitization/>

<sup>41</sup> A. Balgarnie, "Super Connector Platforms Can Drive Digital Trade Facilitation," Hinrich Foundation, 7 March 2023, <https://www.hinrichfoundation.com/research/article/digital/super-connector-platforms-drive-digital-trade-facilitation/>

<sup>42</sup> PierNext, "The Closure of TradeLens: When Technology Is Not Enough," 26 January 2023, <https://piernext.portdebarcelona.cat/en/technology/the-closure-of-tradelens/>

<sup>43</sup> D. Patel, "Internet of Things," *Trade Finance Global*, accessed 11 August 2023, <https://www.tradefinanceglobal.com/tradetech/internet-of-things-iot/>

<sup>44</sup> Salesforce, "New Digital Skills Index from Salesforce Reveals 76% of Global Workers Say They Are Unequipped for the Future of Work," 27 January 2022, <https://www.salesforce.com/news/press-releases/2022/01/27/digital-skills-index-update/>

<sup>45</sup> L.S. Vailshery, "Global IoT and Non-IoT Connections 2010–2025," Statista, 6 September 2022, <https://www.statista.com/statistics/1101442/iot-number-of-connected-devices-worldwide>

Guinea) to 247.4 Mbps (Singapore).<sup>46</sup> Also, even as global 5G coverage is projected to reach 19 percent of all mobile subscriptions by the end of 2023 and to rise to 58 percent in 2029, the gap between different regions is and will continue to be significant. North America had the highest 5G mobile subscription rate of 61 percent in 2023 and is projected to reach a 92 percent rate in 2029; while South East Asia and Oceania had a rate of less than 10 percent in 2023 and is forecasted to reach a 42 percent rate in 2029.<sup>47</sup> These digital divides could hold back the adoption of digital trade platforms.

## Overcoming barriers to adoption

Promoting the adoption of digital tools, and in particular, digital trade platforms, requires more efforts in tackling the issues elaborated above. These include advancing the legal recognition of electronic documents, improving standards and interoperability, enhancing commercial viability, as well as identifying and addressing gaps holistically.

### Advancing legal recognition of electronic documents

Economies need to more widely and formally recognise electronic trade documents through legal frameworks. Internationally, some 60 economies have established the laws and standards for e-signatures, ensuring that electronic contracts may have the same enforceability as physical contracts.<sup>48</sup>

The UK's Electronic Trade Documents Act, which took effect in September 2023<sup>49</sup> and is fully compatible with MLETR, has been hailed as a breakthrough for global trade and may have positive cascading effects as English law forms the basis of several legal systems in the world today and governs at least 80 percent of all BLs.<sup>50</sup>

<sup>46</sup> APEC Policy Support Unit (PSU), "APEC in Charts 2023" (Singapore: APEC, 2023).

<https://www.apec.org/publications/2023/11/apec-in-charts-2023>

<sup>47</sup> Ericsson, "Ericsson Mobility Report" (Stockholm: Ericsson, 2023), <https://www.ericsson.com/4ae12c/assets/local/reports-papers/mobility-report/documents/2023/ericsson-mobility-report-november-2023.pdf>

<sup>48</sup> World Economic Forum (WEF) and WTO, "Global Legal Recognition of Electronic Transactions and Documents," in *The Promise of TradeTech: Policy Approaches to Harness Trade Digitalization* (Geneva: WEF and WTO, 2022), Ch. 2, [https://www.wto.org/english/res\\_e/publications\\_e/tradtechpolicyharrdigit0422\\_e.htm](https://www.wto.org/english/res_e/publications_e/tradtechpolicyharrdigit0422_e.htm)

<sup>49</sup> W. Chetwood and R. Shour, "UK's Electronic Trade Documents Act: A Game Changer," INCECO, 24 July 2023, <https://www.inceco.com/en/news-insights/maritime-uks-electronic-trade-documents-act-game-changer>

The Act relies on two fundamental pillars: possession of the document and the use of a reliable system to accord electronic trade documents the same legal treatment as their paper-based counterparts. Following the example of the UK, as well as Germany and the US, jurisdictions such as France, Japan and Thailand are also looking to harmonise their legal frameworks to boost the legal recognition of electronic documents.<sup>51</sup> To promote this goal, DSI has created the Legal Reform Advisory Board, consisting mostly of multilateral institutions, such as the Asian Development Bank (ADB), the World Bank and UNCITRAL, to advocate for the worldwide harmonisation of legislation, to align with MLETR.

As legislative reform may take time, a short-term measure could be for digital solution providers to develop rulebooks, as has been done by eBL providers such as Bolero (Bolero Rulebook) and WAVE (WAVE Application & Network Bylaws).<sup>52</sup> These frameworks ensure that the eBLs created by the providers can carry out the three functions of a physical BL, namely as a receipt, a document of title and a contract of carriage. Ideally, different solution providers should come together to formulate a globally accepted rulebook. In its absence, providers could align their rulebooks bilaterally or in alliances with groups such as the International Group of Protection and Indemnity Clubs (IGP&I),<sup>53</sup> which provides marine liability coverage to most cargo worldwide.

### Improving global and industry standards and interoperability

The adoption of global standards is integral to facilitating interoperability between systems. Model laws – such as the UNCITRAL Model Law on the Use and Cross-border Recognition of Identity Management and Trust Services (2022), MLETR (2017) and the UNCITRAL Model Law on Electronic Signatures (2001) – provide a harmonised legal framework for economies to facilitate seamless digital trade transactions within and across borders.<sup>54</sup> Regulators may also access the Standards Toolkit for Cross-border Paperless Trade by the WTO and ICC to

<sup>50</sup> C. Southworth, "UK Electronic Trade Documents Bill Goes into Parliament," LinkedIn, 12 October 2022, <https://www.linkedin.com/pulse/uk-electronic-trade-documents-bill-goes-parliament-chris-southworth>

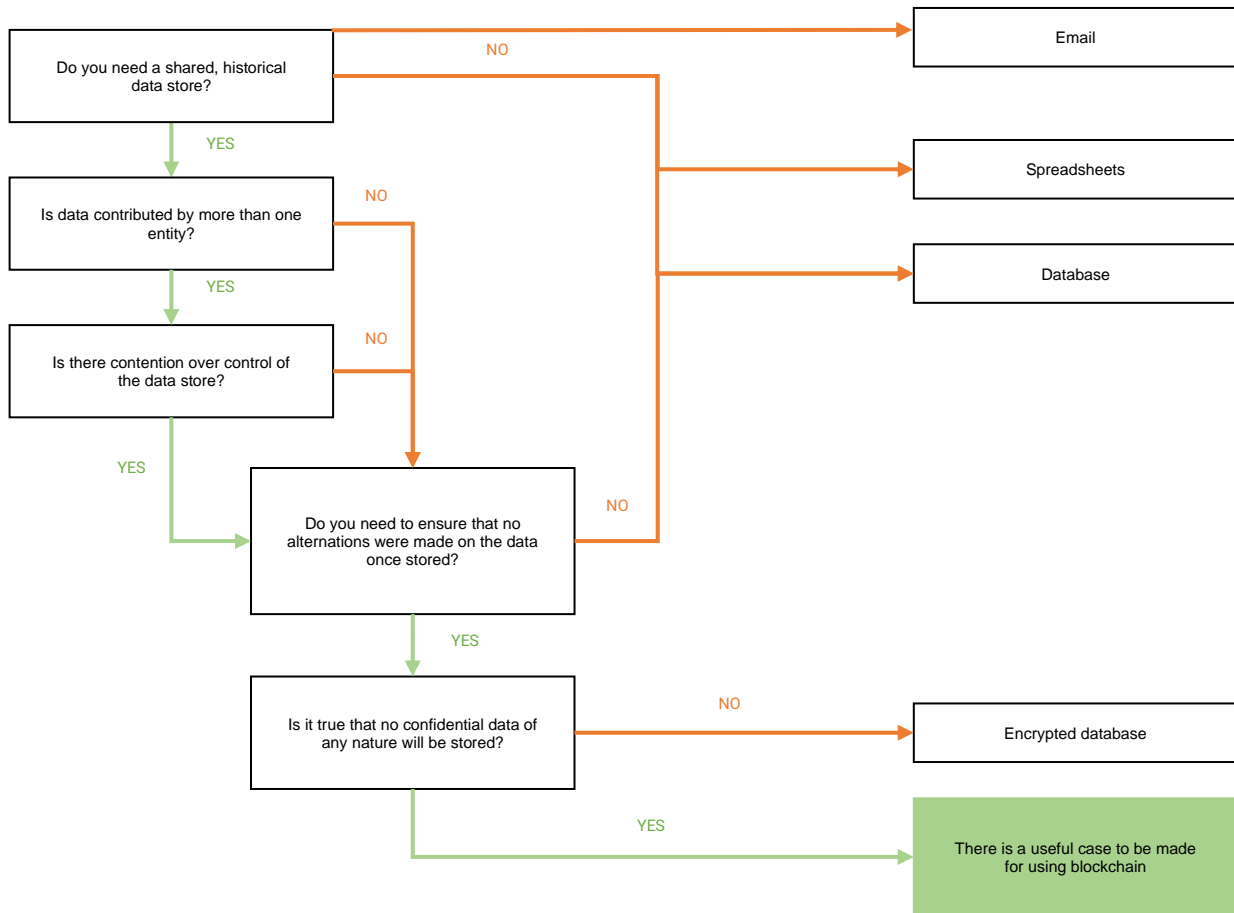
<sup>51</sup> ICC DSI and UNCITRAL, "MLETR Tracker," Economic and Social Commission for Asia and the Pacific (ESCAP), accessed 17 March 2021, <https://www.digitalizetrade.org/MLETR#msdyntrtid=kfazHp0YzeEbxbitWvSvc3SebCOfKN4Gu0oLQcirSb8>. The MLETR Tracker has been co-developed and launched by the DSI and UNCITRAL as a tool to track progress on MLETR adoption and alignment globally.

<sup>52</sup> Bolero (WiseTech Global Group), "Bolero Rulebook and Title Registry Record in Trade Transactions," accessed 17 March 2021, <https://www.bolero.net/rulebook-and-title-registry/>; WaveBL "WAVE BL SAAS Platform Terms and Conditions," accessed 11 August 2023, <https://wavebl.com/terms-and-conditions/>

<sup>53</sup> International Group of P&I Clubs, website, accessed 18 March 2023, <https://www.igpandi.org/>

<sup>54</sup> UNCITRAL, "Electronic Commerce", accessed 11 August 2023, <https://uncitral.un.org/en/texts/ecommerce>





**Figure 2. Decision tree on when to use blockchain**

Source: Adapted from: UN Centre for Trade Facilitation and Electronic Business, “Blockchain in Trade Facilitation,” UN Economic Commission for Europe (UNECE), Geneva, 2020, <https://unece.org/info/Trade/CEFACT/pub/21826>; UN Conference on Trade and Development (UNCTAD), “Global Report on Blockchain and Its Implications on Trade Facilitation Performance” (Geneva: UNCTAD, 2023), [https://unctad.org/system/files/official-document/tcsdtlinf2023d1\\_en.pdf](https://unctad.org/system/files/official-document/tcsdtlinf2023d1_en.pdf)

implement the various existing global standards in their domestic legislation.<sup>55</sup>

To enhance data interoperability, it is crucial to promote the adoption of international standards for (electronic) trade documents. DSI’s efforts to provide guidance on the digital standards for key trade documents and data elements are of paramount importance here. Additionally, the private sector can collaborate actively to promote interoperability in international trade by associating through different alliances representing stakeholders along the supply chain of international trade, including the DSI’s Industry Advisory Board. This could strengthen inter-industry cooperation to create interoperable data standards across platforms and international jurisdictions.

<sup>55</sup> Ganne and Nguyen, “Standards Toolkit for Cross-Border Paperless Trade.”  
<sup>56</sup> Ganne and Nguyen, “Standards Toolkit for Cross-Border Paperless Trade.”

Last but not least, promoting open, technology-agnostic approaches to connect siloed systems is essential.<sup>56</sup> One example is TradeTrust,<sup>57</sup> which provides a comprehensive approach to support the interoperable exchange of both normal and transferable electronic trade documents across platforms. Frameworks like TradeTrust, which is fully open source, free of charge, and MLETR compliant, streamline connections and data exchange between platforms with disparate interfaces and technology.

### Enhancing commercial viability

Platform providers need to consider the commercial viability of their business models instead of only the functionality of their technology. It is important to regularly review cost structures and eliminate sources

<sup>57</sup> Singapore Infocomm Media Development Authority (IMDA), “TradeTrust,” last updated 18 August 2023, <https://www.imda.gov.sg/how-we-can-help/international-trade-and-logistics/tradetrust>

of inefficiency. For instance, while blockchain is an important technology in digitalising trade, not all processes need blockchain. Figure 2 provides a general overview of the cases that may require a blockchain in terms of functional processes. Komgo (a trade finance platform), for example, no longer offers a blockchain-based LC for reasons that include costs and scalability.<sup>58</sup> Digital trade platforms consist of several components, each requiring substantial investment to build, maintain and upgrade.<sup>59</sup> As operating a digital trade platform requires significant capital commitment with no guarantee of success, potential providers and/or services suppliers have to carefully consider if it would be better to participate in existing platforms instead of creating their own platforms.

Additionally, platforms need to strengthen its network effects and diversify its service offerings. The value of a digital trade platform improves dramatically with the number of users and with additional services being offered. For example, Galileo Multi-Bank for Corporates provides multi-bank connectivity and enables businesses to manage various documents including LCs, Documentary Collections and eBL in a single platform.<sup>60</sup>

## Identifying and addressing gaps holistically

Economies should adopt holistic approaches to digital transformation. In the context of supporting trade digitalisation, it is important to identify the specific chokepoints that could hinder progress. Examples of chokepoints include: technology investments that primarily focus on ports (rather than the broader port community); MSMEs having issues of technological obsolescence, and interoperability with their larger counterparts; varying level of broadband connectivity across the economy; and legislative gaps hindering the effective implementation of paperless trade.<sup>61</sup>

APEC stakeholders share this concern with identifying, and addressing, chokepoints. A 2022 survey conducted by the APEC Transportation Working Group has shown that chokepoints such as lack of information and communications technology (ICT) infrastructure, lack of qualified workers and scepticism among stakeholders have a high impact on the development of SWs or port community systems, which in turn is pivotal to digitalisation in the port and maritime sector.<sup>62</sup>

There are various aspects to addressing the chokepoints. On stakeholder engagement, for example, trade facilitation committees could enhance communication and coordination among stakeholders to create synergies and establish unified access points for transport and trade procedures throughout the supply chain.<sup>63</sup> On digital infrastructure, it is crucial to improve coverage and ensure that the infrastructure is constantly upgraded so that various stakeholders could access digital platforms and participate in the ecosystem. Policymakers should also have targeted initiatives to ensure affordability.<sup>64</sup> As an illustration, Korea has achieved low-cost internet and a high internet penetration rate through a cohesive private–public partnership.<sup>65</sup> On legislative gaps, economies can connect with DSI and the members of its Legal Reform Advisory Board to explore collaborative efforts to promote a harmonised and conducive legal framework for effective paperless trade.

Some chokepoints are economy-specific and can be addressed through domestic solutions, while others necessitate collaboration between economies. At the same time, domestic and global issues are interconnected. For example, an economy might facilitate domestic electronic transactions by recognising more electronic documents in its regulations. This domestic effort could be further ‘globalised’ by advocating for wider adoption of UNCITRAL instruments to foster international harmonisation.

<sup>58</sup> S. Wass, “Trade Finance Industry Remains Hopeful on Blockchain despite Failed Projects,” S&P Global, 27 October 2022, <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/trade-finance-industry-remains-hopeful-on-blockchain-despite-failed-projects-72557910>

<sup>59</sup> P. Bendor-Samuel, “Understanding Digital Platform Costs,” *Forbes*, 30 November 2021, <https://www.forbes.com/sites/peterbendorsamuel/2021/11/30/understanding-digital-platform-costs/?sh=2d5d4cea41ae>

<sup>60</sup> Bolero, “Galileo Multi-Bank for Corporates,” accessed 20 December 2023, <https://www.bolero.net/galileo-multi-bank-for-corporates/>

<sup>61</sup> WEF, “Supply Chain 4.0: Global Practices and Lessons Learned for Latin America and the Caribbean,” WEF, Geneva, 2019, [https://www3.weforum.org/docs/WEF\\_Supply\\_Chain\\_4.0\\_2019\\_Report.pdf](https://www3.weforum.org/docs/WEF_Supply_Chain_4.0_2019_Report.pdf)

<sup>62</sup> APEC, “Promote Supply Chain Connectivity by Enhancing and Better Understanding Digital Innovation in APEC Port Industry” (Singapore: APEC, 2022), <https://www.apec.org/publications/2022/06/promote-supply-chain-connectivity-by-enhancing-and-better-understanding-digital-innovation-in-apec-port-industry>; World Bank, “Accelerating Digitalization: Critical Actions to Strengthen the Resilience of the Maritime Supply Chain” (Washington, DC: World Bank, 2020), <https://pubdocs.worldbank.org/en/773741610730436879/Accelerating-Digitalization-Across-the-Maritime-Supply-Chain.pdf>

<sup>63</sup> World Bank, “Accelerating Digitalization.”

<sup>64</sup> Access Partnership, “Prosperous APAC: Digital Economy Enablers” (Access Partnership, 2022), <https://accesspartnership.com/wp-content/uploads/2022/09/Prosperous-APAC-digital-economy-enablers.pdf>

<sup>65</sup> J. Lee, “Why Does South Korea Have Faster Internet for a Cheaper Price Tag?” Public Knowledge, 19 July 2017, <https://publicknowledge.org/why-does-south-korea-have-faster-internet-for-a-cheaper-price-tag/>

## Role of international and regional organisations

International and regional organisations such as APEC and ADB play a critical role in promoting digitalisation as well as the adoption of digital trade platforms and of the enabling legal framework for the digitalisation of trade. In APEC, digital platforms are a key enabler of cross-border trade and firmly support the APEC goal of regional economic integration.

Overcoming barriers to adoption requires coordination and collaboration between economies and among government agencies, as well as engagement with the private sector given their integral role in global value chains (GVCs). APEC provides the avenue to share information, to undertake capacity-building activities, and to explore cross-fora collaboration. For example, the APEC Committee on Trade and Investment (CTI) has held events discussing key topics such as fostering interoperability between digital systems, building trust in digital solutions and the importance of political will in promoting the growth of such industries.<sup>66</sup> In addition, the APEC CTI Compendium of Best Practice Technology Solutions for Single Window Interoperability<sup>67</sup> provides a comprehensive analysis of APEC members' SW systems, covering aspects such as the use of international standards, governance structures, IT infrastructure, interoperability, responsiveness, sustainability and features/functionality.

The APEC Policy Support Unit (PSU) has also undertaken evidence-based research and analysis to support APEC's work in this area. For example, a study on the application of global data standards (GDS) to supply chain connectivity, which involved pilot projects in several member economies, has provided a quantitative measure of the benefits and costs of applying GDS at the product level to improve supply chain visibility and border management practices.<sup>68</sup> Another study on SW interoperability<sup>69</sup> proposes ten principles of interoperability, and underscores the need for ongoing collaboration between economies to establish a pragmatic working definition of 'interoperability' as well as to explore how interoperability can be achieved and sustained.

DSI, co-founded by ADB and Singapore under the ICC umbrella, aims to accelerate a globally harmonised, digitised trade environment. The private sector is encouraged to examine the set of digital trade standards issued by DSI, which serve as reference for a simplified baseline of standards for any user looking into supply chain and trade digitalisation. ADB, in collaboration with UNCITRAL, DSI and other stakeholders, is playing a critical role in efforts to harmonise legal frameworks by publishing knowledge products, carrying out capacity-building activities, and deploying technical advisory support to some of its member economies to support legislative reform.

The collaborative efforts of international organisations stand as crucial drivers in propelling the digitalisation of trade and the adoption of innovative platforms. As we move into the future, the ongoing work and evolving standards are poised to shape a resilient and interconnected global landscape for digital trade.

<sup>66</sup> APEC Committee on Trade and Investment (CTI), "Utilizing Digital Technology in the Field of Trade Facilitation under the Current COVID-19 Pandemic and Beyond: Beyond Practices Sharing Workshops" (Singapore: APEC, 2021), [https://www.apec.org/docs/default-source/publications/2021/12/utilizing-digital-technology-in-the-field-of-trade-facilitation-under-the-current-covid-19-pandemic-and-beyond-beyond-practices-sharing-workshops/221\\_cti\\_utilizing-digital-technology-in-the-field-of-trade-facilitation.pdf?sfvrsn=5f4be66c\\_2](https://www.apec.org/docs/default-source/publications/2021/12/utilizing-digital-technology-in-the-field-of-trade-facilitation-under-the-current-covid-19-pandemic-and-beyond-beyond-practices-sharing-workshops/221_cti_utilizing-digital-technology-in-the-field-of-trade-facilitation.pdf?sfvrsn=5f4be66c_2)

<sup>67</sup> APEC, "Compendium of Best Practice Technology Solutions for Single Window Interoperability" (Singapore: APEC, 2019), [https://www.apec.org/docs/default-source/publications/2019/11/compendium-of-best-practice-technology-solutions-for-single-window-interoperability/219\\_cti\\_compendium-of-best-practice-technology-solutions-for-single-window-interoperability.pdf?sfvrsn=8441ba93\\_1](https://www.apec.org/docs/default-source/publications/2019/11/compendium-of-best-practice-technology-solutions-for-single-window-interoperability/219_cti_compendium-of-best-practice-technology-solutions-for-single-window-interoperability.pdf?sfvrsn=8441ba93_1)

<sup>68</sup> A. Bayhaqi et al., "Study on the Application of Global Data Standards for Supply Chain Connectivity – Phase 2" (Singapore: APEC, 2017), [https://www.apec.org/docs/default-source/publications/2017/11/study-on-the-application-of-gds-for-supply-chain-connectivity---phase-2/217\\_psu\\_study-on-the-application-of-global-data-standards-for-supply-chain-connectivity-phase-2.pdf?sfvrsn=528ebb42\\_1](https://www.apec.org/docs/default-source/publications/2017/11/study-on-the-application-of-gds-for-supply-chain-connectivity---phase-2/217_psu_study-on-the-application-of-global-data-standards-for-supply-chain-connectivity-phase-2.pdf?sfvrsn=528ebb42_1)

<sup>69</sup> L. Vives, A. Bayhaqi, and S.K. Singh, "Study on Single Window Systems' International Interoperability: Key Issues for Its Implementation" (Singapore: APEC, 2018), [https://www.apec.org/docs/default-source/publications/2018/8/study-on-single-windows-systems/218psustudy-on-single-windows-systems.pdf?sfvrsn=d3347f05\\_1](https://www.apec.org/docs/default-source/publications/2018/8/study-on-single-windows-systems/218psustudy-on-single-windows-systems.pdf?sfvrsn=d3347f05_1)

## The Authors

**Andre Wirjo, Akhmad Bayhaqi** and **Ee Ting Oh** are respectively, Analyst, Senior Analyst and former Intern with the APEC Policy Support Unit (PSU).

This policy brief is a collaborative effort between the APEC PSU and the Asian Development Bank (ADB). The authors acknowledge the contributions of Cyn-Young Park, Director of Regional Cooperation and Trade with the Climate Change and Sustainable Development Department at the ADB; James Villafuerte, Regional Lead Economist with the ADB's Economic Research and Development Impact Department; and Carmen Maria Ramirez Ortiz, Consultant with the ADB's Trade and Supply Chain Finance Program.

The authors would like to thank Carlos Kuriyama, Director of APEC PSU, for his valuable comments, and to Eldo Malba Simanjuntak, Researcher of APEC PSU, for his excellent research assistance.

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.

This work is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.

---

## About APEC PSU

The **APEC Policy Support Unit (PSU)** is the policy research and analysis arm for APEC. It supports APEC members and fora in improving the quality of their deliberations and decisions and promoting policies that support the achievement of APEC's goals by providing objective and high-quality research, analytical capacity and policy support capability.

**Address:** 35 Heng Mui Keng Terrace,  
Singapore 119616

**Website:** [www.apec.org/About-Us/Policy-Support-Unit](http://www.apec.org/About-Us/Policy-Support-Unit)

**E-mail:** [psugroup@apec.org](mailto:psugroup@apec.org)

**APEC#224-SE-01.7**

---