



Trade, Investment and Innovation

Trade Digitalization Index: A new tool for assessing the global state of play in the digitalization of trade procedures

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Abstract

This paper introduces the Trade Digitalization Index (TDI) for assessing global progress in digitalizing trade procedures, a new metric based on data from the UN Global Survey on Digital and Sustainable Trade Facilitation. The TDI provides a measure of the integration of information and communication technologies into international trade processes, focusing on the implementation of two groups of measures: 'paperless trade' and 'cross-border paperless trade'. The TDI scores highlight wide disparities across the 163 countries covered in implementation of trade digitalization measures.

Keywords: Digital trade, sustainable development, trade facilitation, international trade, global, index

JEL: B17, B27, C43, F01, F13, F14, F15, O24, P33, P45, Q27, Q37

While progress has been made between 2021 and 2023, a digitalization gap exists between high and low-income countries. To address it and further accelerate progress, the paper emphasizes the importance of collaborative efforts, international standards, and legal harmonization. It concludes by underscoring the potential of TDI as a tool for policymakers, international organizations, and researchers, and suggests avenues for future development and application of the index in fostering global trade digitalization.

1. Introduction

1.1. Background and objectives

Trade digitalization involves the integration of modern information and communication technologies (ICT) into processes associated with the movement of physical goods across international borders. A notable example of this application is the utilization of web-based technology to enhance transparency and efficiency in tracking goods throughout the entire supply chain. The concept of trade digitalization comprises two primary components. Firstly, 'paperless trade' entails the adoption of electronic formats, replacing traditional paper-based documentation systems, with the aim of expediting trade processes and reducing associated costs. Secondly, 'cross-border paperless trade' represents the next level, incorporating measures that facilitate cross-border mutual recognition and exchange of trade-related data and documents in electronic form.

Trade digitalization holds significant importance due to its ability to enhance and streamline trade procedures, resulting in various benefits. Firstly, it enables more efficient trade by lowering compliance costs, facilitating faster movement of goods, and reducing inventory expenses¹. This is particularly important in a context where trade costs remain high in many regions². Additionally, by reducing clearance times, trade digitalization contributes to increased port efficiency, mitigating issues related to port congestion. The efficiency gained through trade digitalization is crucial for maintaining trade competitiveness.

Furthermore, it creates opportunities for small

and medium-sized enterprises (SMEs) to actively participate in cross-border trade and addresses contemporary challenges related to increased small shipments and cross-border e-commerce³. The transparency afforded by trade digitalization is crucial, as it improves regulatory control and compliance for governments, especially when relevant data and documents can be seamlessly exchanged among agencies and across borders. Notably, this digital transformation also contributes to limiting greenhouse gas emissions⁴.

The increasing recognition of substantial benefits for both governments and traders has prompted a growing number of countries and international organizations to advocate for the digitalization of trade procedures. Notably, multilateral and preferential trade agreements now incorporate sections specifically addressing paperless trade, highlighting its widespread acceptance. However, the implementation of trade digitalization is not without challenges⁵. Infrastructure gaps present a significant hurdle, with some countries lacking the necessary human, technical, or financial resources to establish a robust digital infrastructure. Legal and regulatory hurdles further complicate matters, as divergent frameworks across regions demand harmonization efforts to ensure compliance and smooth operations in the adoption of standardized digital practices. Achieving global coordination and agreement on standardized digital trade practices poses another challenge, given the diverse interests and priorities of different countries and stakeholders involved in

¹ Duval, Y. and Mengjing, K., 2017. Digital trade facilitation: Paperless trade in regional trade agreements (No. 747). ADBI Working Paper.

² ESCAP-World Bank Trade Cost Database, updated July 2023. Available at: <https://www.unescap.org/resources/escap-world-bank-trade-cost-database>

³ Duval, Y., Wang, T., Utoktham, C. and Kravchenko, A., 2019. Next-generation trade facilitation for Asian integration: Cross-border paperless trade. *Journal of Asian Economic Integration*, 1(1), pp.11-31.

⁴ Duval, Y. and Hardy, S., 2021. Climate change and trade facilitation: estimating greenhouse gas emission savings from implementation of cross-border paperless trade in

Asia and the Pacific. *Journal of Asian Economic Integration*, 3(2), pp.190-210; See also ESCAP-UNCTAD-UNEP APTIR 2021 on climate smart trade and investment at: www.unescap.org/kp/APTIR2021; and ESCAP-UNCTAD-UNIDO APTIR 2023 on digital trade for sustainable development at: www.unescap.org/kp/APTIR2023.

⁵ Ha, S.H. and Lim, S.W., 2014. The Progress of Paperless Trade in Asia and The Pacific: enabling international supply chain integration (No. 137). ADB Working Paper Series on Regional Economic Integration.

international trade. These challenges underscore the complexities associated with the widespread adoption of trade digitalization and emphasize the need for collaborative efforts to address them effectively.

In this context, this report introduces the Trade Digitalization Index (TDI), a novel measure for assessing global progress in digitalizing trade procedures based on data from the UN Global Survey on Digital and Sustainable Trade Facilitation – available at www.untfsurvey.org. The TDI will be examined to reveal insights into digitalization trends and changes over time. This index addresses the need for a standardized tool to evaluate a country's performance in digitalizing trade processes. It offers governments a means to assess their progress, pinpoint weaknesses, and facilitates international organizations in identifying areas requiring additional support. Furthermore, the TDI can be a valuable resource for academic research, filling a gap in the literature as no such measure currently exists for quantifying the global digitalization of trade procedures.

1.2. Methodology

The Trade Digitalization Index (TDI) focuses on the "Digital Trade Facilitation" group of measures in the UN Global Survey. This group is composed of two sub-groups, namely "paperless trade" and "cross-border paperless trade" measures, comprising a total of 15 measures (see Table 1).⁶ Data from the UN survey classifies each measure as "fully implemented," "partially implemented," "on a pilot basis," "not implemented," or "don't know." In this initial version of the TDI, the assigned scores of 3, 2, 1, or 0 for each implementation stage were used to calculate implementation rates across countries, regions, or groupings, giving equal weight to the 15 measures included. The Trade Digitalization Index score of a country C is thus calculated as:

$$TDI_C = \sum_{m_{pt}=1}^9 \frac{i_{m_{pt}}}{FI} + \sum_{m_{cpt}=1}^6 \frac{i_{m_{cpt}}}{FI}$$

where i_m is the implementation score of that country for paperless trade (pt) or cross-border paperless trade (cpt) measure m considered, and FI is the full implementation score (i.e., $FI = 3$). This index serves as a benchmark for nations aspiring to assess and improve their progress in trade digitalization.

Table 1: Sub-groups and measures included in the trade digitalization index.

| Sub-groups | Measures |
|---|---|
| Paperless trade | Automated Customs System |
| | Internet connection available to Customs and other trade control agencies |
| | Electronic Single Window System |
| | Electronic submission of Customs Declarations |
| | Electronic application and issuance of import and export permit |
| | Electronic submission of Air Cargo Manifests |
| | Electronic application and issuance of Preferential Certificate of Origin |
| | E-Payment of Customs Duties and Fees |
| Cross-border paperless trade | Electronic application for Customs refunds |
| | Laws and regulations for electronic transactions |
| | Recognized certification authority |
| | Electronic exchange of Customs Declaration |
| | Electronic exchange of Certificate of Origin |
| | Electronic exchange of Sanitary and Phyto-Sanitary Certificate |
| Paperless collection of payment from a documentary letter of credit | |

Source: Authors, based on United Nations (2023).

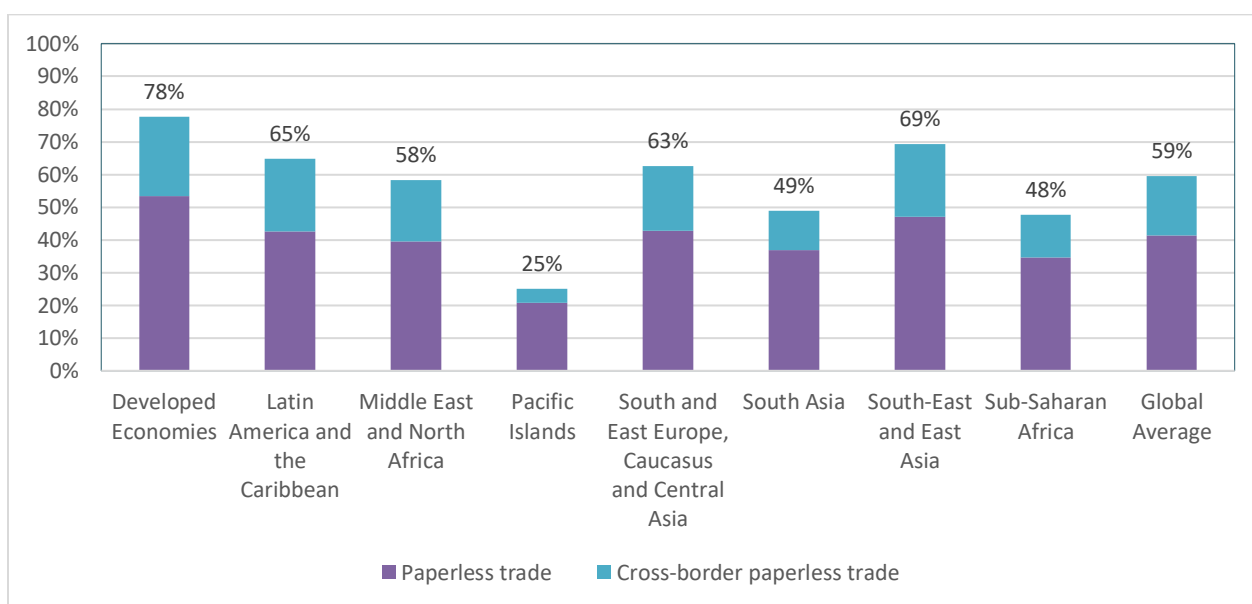
⁶ Electronic Submission of Sea Cargo Manifests is excluded when calculating the overall score as they are not relevant to all countries surveyed.

2. Trade digitalization: Overview

Figure 1 presents the average trade digitalization rates by region, offering an overview of the collective progress across different geographic areas. The detailed implementation rates of trade digitalization measures for specific regions and countries can be found in Annex 1 and 2. Notably, there are substantial variations in the level of implementation both across regions and individual economies. Across regions, there is a noteworthy 53-percentage-point range in implementation rates, underscoring the diversity in the adoption of digital trade practices globally. Additionally, significant variations exist between individual economies. For instance, in the Middle East and North Africa, implementation rates range from 31% in Yemen to 91% in Saudi Arabia, resulting in an average regional rate of 58%. These disparities highlight the nuanced landscape of trade digitalization, emphasizing the need for targeted strategies tailored to specific regions and economies.

Among individual countries, leaders in overall trade digitalization include the Netherlands and New Zealand, both achieving an impressive 96%, along with Australia, Belgium, the Republic of Korea, and Singapore, each securing a commendable 93%. In the realm of developing regions, Singapore and the Republic of Korea stand out as frontrunners in South-East and East Asia, both achieving a remarkable 93%, while Brazil and Peru take the lead in Latin America and the Caribbean, both with a noteworthy 91%. Saudi Arabia emerges as the pacesetter in the Middle East and North Africa, attaining a substantial 91%. Turning to South and East Europe, Caucasus, and Central Asia, Uzbekistan leads with an 89% implementation rate, closely followed by Azerbaijan and Turkey, each at 80%. Meanwhile, India takes the lead in South Asia, boasting the highest implementation rate at 87%. These findings illustrate the diverse landscape of trade digitalization globally, with certain countries showcasing notable achievements in adopting digital trade practices.

Figure 1: Average trade digitalization rates around the world (2023)



Source: Duval et al., based on data www.untfsurvey.org.

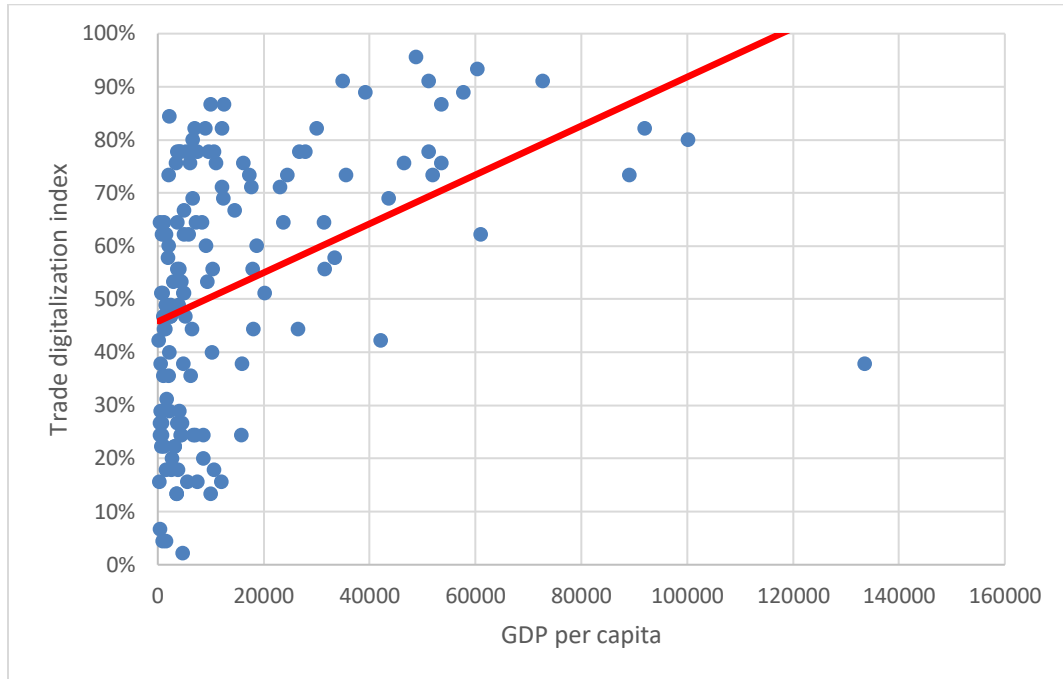
A discernible trend emerges in trade digitalization, where advanced economies consistently outperform developing ones, as

illustrated in Figure 2. Specifically, the data indicates that among the 90 countries with a GDP per capita below US\$ 10,000, only 38 (or 42%)

have achieved implementation rates exceeding 50%. This trade digitalization gap, which may be attributed to the scarcity of human, technical, and financial capital, underscores the

importance of identifying implementation and then addressing constraints to facilitate broader and more equitable advancements in trade digitalization.

Figure 2: Average trade digitalization rates and GDP per capita



Source: Authors, based on data www.untfsurvey.org.

Note: This figure is based on data from the year 2021.

2.1. Implementation in countries with special needs

Figure 3 provides an overview of trade digitalization rates across 163 economies, categorized into developed countries, seven developing regions, and three groups with special needs: Landlocked Developing Countries (LLDCs), Least Developed Countries (LDCs), and Small Island Developing States (SIDS). Note that the measure "Electronic submission of Sea Cargo Manifests" is excluded from the analysis as it is not universally applicable to all national contexts.

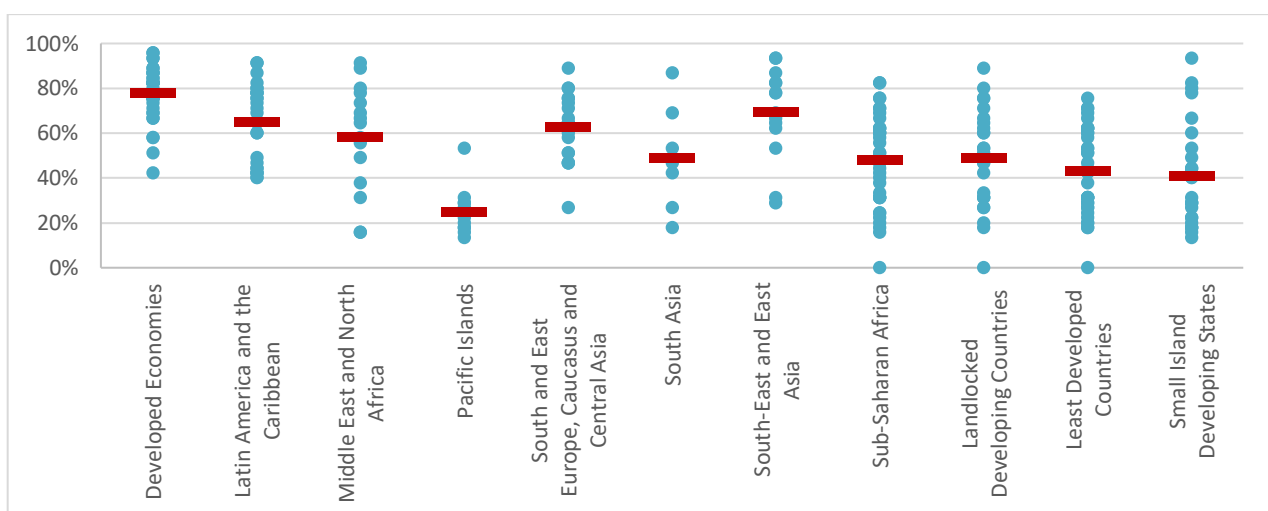
Based on the 2023 data, the global average Trade Digitalization Index score for the 15 core measures stands at 59%. However, there are substantial variations in implementation rates among different regions. Developed Economies exhibit the most robust performance, with a digitalization rate of 78%. Among Developing Economies, South-East and East Asia lead with a score of 69%, followed by Latin America and the Caribbean at 65%, and the South and East Europe, Caucasus, and Central Asia region at 63%.

Conversely, certain regions are still in the process of catching up, notably exemplified by the Pacific Islands region, which exhibits the lowest regional implementation score at 25%.

The challenges in achieving high scores are underscored by the nature of 'paperless trade' and 'cross-border paperless trade' measures, which often necessitate extensive cooperation between trading partners to be deemed "fully implemented." Consequently, the establishment of additional regional trade agreements and trade facilitation initiatives can serve as a catalyst for enhancing digital trade cooperation.

Figure 3 highlights that LDCs, LLDCs, and SIDS share similar average implementation rates, ranging between 49% and 41%, notably below the global average of 59%. This discrepancy can be attributed to lower levels of human, technical, and financial capacity, placing these countries at a disadvantage in both national and subnational digitalization efforts and integration for cross-border trade. Recognizing these challenges, it becomes imperative for the international community to actively support the endeavors of LDCs, LLDCs, and SIDS in enhancing trade digitalization. This support should be tailored to address their specific needs, encompassing technical assistance and capacity-building initiatives, thereby contributing to the overall objective of fostering more inclusive and equitable global trade practices.

Figure 3: Average trade digitalization rates by region and in countries with special needs (2023)



Source: Duval et al., based on data www.untfsurvey.org.

2.2. Most and least implemented trade digitalization measures

Figure 4 provides a comprehensive overview of the implementation rates for the two sub-groups of trade digitalization measures, revealing substantial disparities between the 'paperless trade' and 'cross-border paperless trade' components. The digitalization rate for 'paperless trade' stands at 69%, while the rate for 'cross-border paperless trade' is notably lower at 46%. Elevating the score for cross-border paperless trade is crucial due to potential efficiency gains, such as lower costs and logistical improvements, and the consequential limitation of carbon emissions.

Table 2 provides insights into the progress of implementing trade digitalization measures within the two distinct sub-groups, corroborating the trends observed in Figure 4. Notably, the 'paperless trade' sub-group exhibits the highest level of implementation, with both the highest and lowest implemented measures surpassing their 'cross-border paperless trade' counterparts.

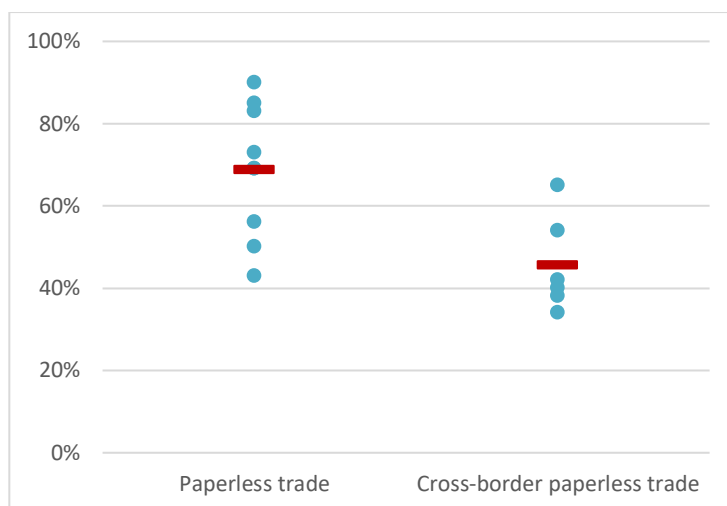
The implementation level for 'cross-border paperless trade' stands at 46%, considerably lower than measures in other sub-groups, highlighting a significant disparity between the most and least implemented measures within this sub-group. For instance, the measure 'laws and regulations for electronic transactions' has been at least partially implemented by 83% of countries in this sub-group, but only 37% have fully implemented it. Similarly, the 'electronic exchange of Certificates of Origin' is implemented by 55% of countries, with only 6% achieving full implementation. Achieving full implementation of cross-border paperless trade measures remains challenging, influenced by the readiness of partner countries. Consequently, there is a pressing need for closer intergovernmental cooperation on cross-border paperless trade to foster greater

interoperability between national systems, addressing the complexities involved in this aspect of trade digitalization.

Both Table 2 and Figure 4 underscore the variability in the ease of implementation for different trade digitalization measures, with some proving more achievable than others, and certain measures being easier to fully implement than others. For instance, the 'Automated Customs System' measure stands out as the most widely implemented, with 98.8% of countries having it implemented, at least on a pilot basis, and 76% achieving full implementation—an example of a measure that is comparatively easier to implement since it is typically under the responsibility of a single and well-resourced agency.

Conversely, the 'Laws and regulations for electronic transactions' measure has been partially implemented by approximately 83% of countries but fully implemented by only 37%, highlighting a case where the measure is easier to implement partially but more challenging to fully implement, as legal and regulatory changes affect a potentially diverse group of stakeholders. Similarly, the 'Electronic exchange of Certificate of Origin' measure has been partially implemented by approximately 55% of countries but fully implemented by only 6%, exemplifying a measure that is difficult to implement both partially and fully. These findings suggest the presence of "low-hanging fruit", that is, measures that are easier to implement widely, emphasizing their importance as initial priorities. Once these measures are established, subsequent efforts can focus on more challenging measures that necessitate greater cooperation and integration. This strategic approach may ensure a step-by-step progression in enhancing trade digitalization.

Figure 4: Implementation rates of the two sub-groups of trade digitalization measures (2023)



Source: Authors, based on data from www.unftfsurvey.org.

Table 2: Most and least implemented measures (2023)

| Sub-group of trade digitalization measures | Most implemented (% of countries) | | | Least implemented (% of countries) | | |
|--|--|---|-------------------------|--|---|-------------------------|
| | Measure | Implemented fully, partially and on a pilot basis (%) | Full implementation (%) | Measure | Implemented fully, partially and on a pilot basis (%) | Full implementation (%) |
| Paperless trade | Automated Customs System | 98.8 | 76.1 | Electronic Application for Customs Refunds | 56.4 | 25.2 |
| Cross-border paperless trade | Laws and regulations for electronic transactions | 82.8 | 37.4 | Electronic exchange of Certificate of Origin | 54.6 | 5.5 |

Source: Authors, based on data www.unftfsurvey.org.

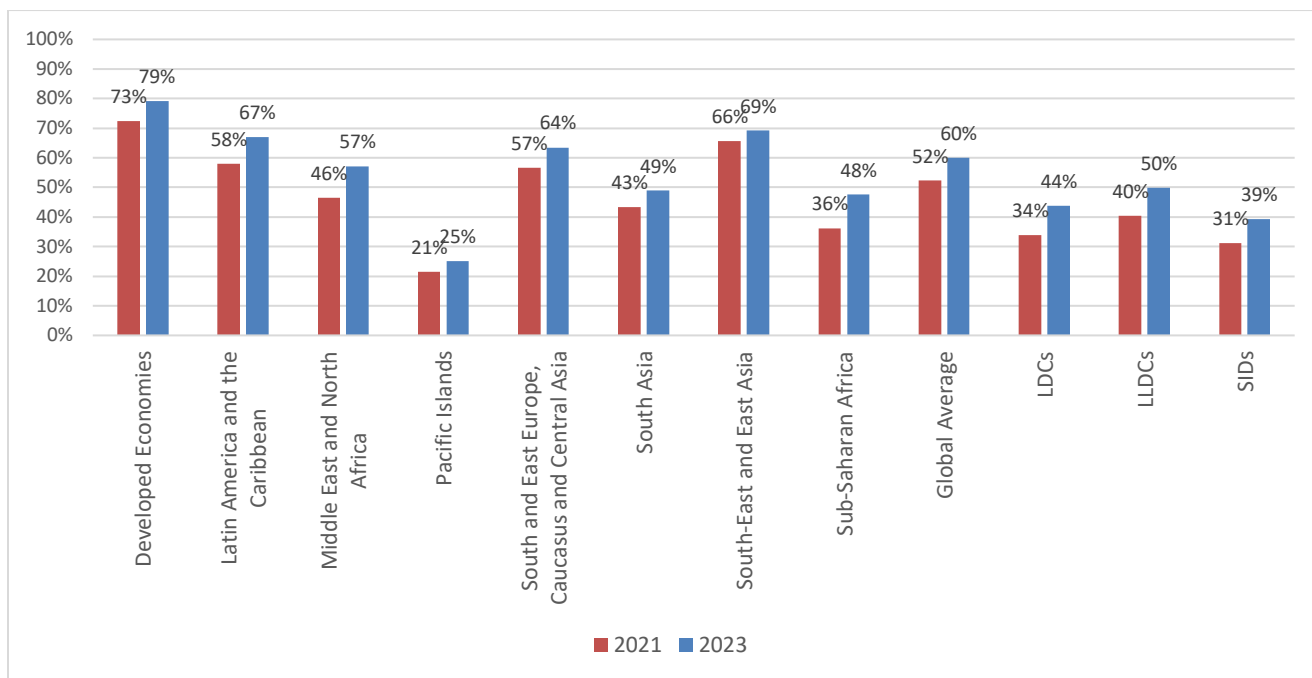
2.3. Progress in implementation between 2021-2023

The 2023 TDI data encompasses a total of 163 countries, of which 144 were also included in the 2021 data. The analysis focuses exclusively on countries covered in both years to facilitate a comparative assessment of progress in implementing trade digitalization measures over the previous two years.

Figure 5 provides a visual representation of progress based on regional implementation rates between 2021 and 2023. The global digitalization rate has shown an encouraging increase of 8 percentage points during this period for the common countries participating in

both surveys. Notably, Sub-Saharan Africa and the Middle East and North Africa region have demonstrated the most substantial progress, with digitalization rates increasing by 12 and 11 percentage points, respectively. Countries with special needs, specifically LDCs and LLDCs, have also made remarkable strides, each showing a 10-percentage-point improvement—a noteworthy achievement considering the additional challenges these countries face due to limited human, technical, and financial capacity for implementing paperless trade systems.

Figure 5: Trade digitalization rates by region between 2021 and 2023

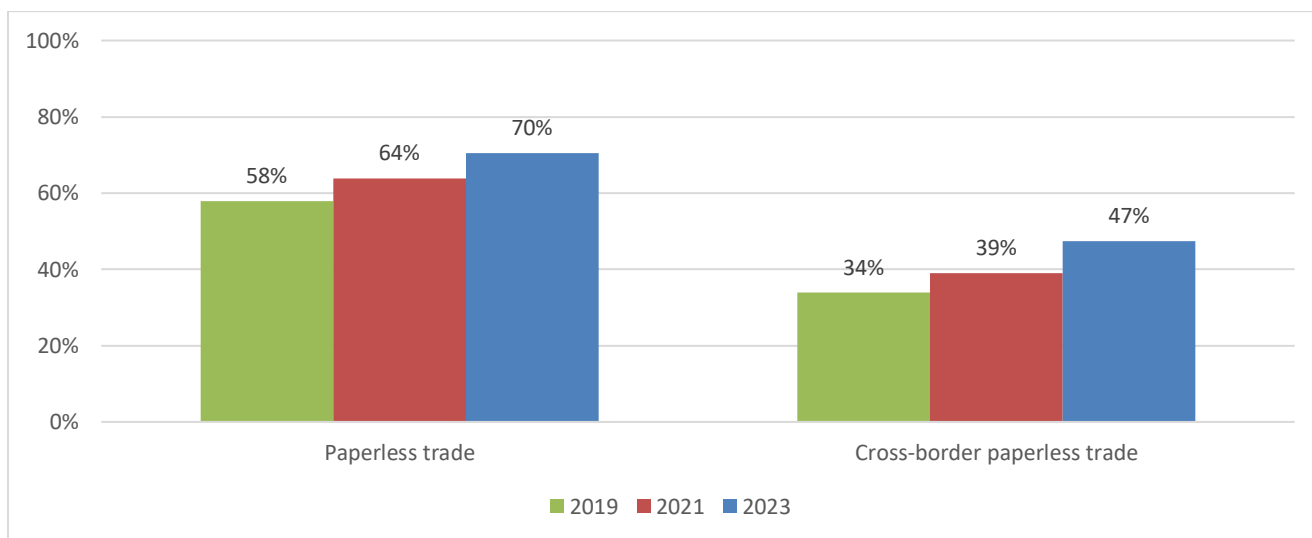


Source: Duval et al., based on data www.untfsurvey.org.

The impact of the COVID-19 pandemic emerges as a contributing factor, as countries were compelled to promote trade digitalization amid restrictions on in-person interactions. Figure 6 provides a view of the improvement between 2019 and 2023 across the two sub-groups of trade facilitation measures for 128 common countries. Progress is evident across all sub-groups, with 'paperless trade' and 'cross-border

'paperless trade' witnessing notable increases of 12 and 13 percentage points, respectively. This consistent improvement signals an ongoing commitment to enhancing digital systems and the accelerated implementation of paperless trade⁷, underscoring the resilience and adaptability of countries in the face of evolving challenges.

Figure 6: Implementation rates of two sub-groups of trade digitalization measures (Global averages, 2019-2023)



Source: Duval et al., based on www.untfsurvey.org

⁷ ESCAP, 2021, Trade Facilitation in Times of Crisis and Pandemic: Practices and Lessons from the Asia-Pacific Region. Available at <https://www.unescap.org/kp/2021/trade-facilitation-times->

[crisis-and-pandemic-practices-and-lessons-asia-pacific-region](https://www.unescap.org/kp/2021/trade-facilitation-times-crisis-and-pandemic-practices-and-lessons-asia-pacific-region).

3. Implementation of trade digitalization measures: A closer look

3.1. Paperless trade

The 'paperless trade' category encompasses nine trade facilitation measures that leverage modern information and communication technologies (ICT) in trade procedures, ranging from basic Internet connectivity to comprehensive electronic Single Window systems. These measures, identified in WTO TFA Articles 7 and 10 and the Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific, play a crucial role in enhancing global trade efficiency. As depicted in Figure 7, the global implementation of 'paperless trade' measures stands at 69%, exhibiting variations across regions. Notably, 'Automated Customs systems' and 'Internet connection for Customs and trade control agencies' boast high global implementation rates of 90% and 85%, respectively.

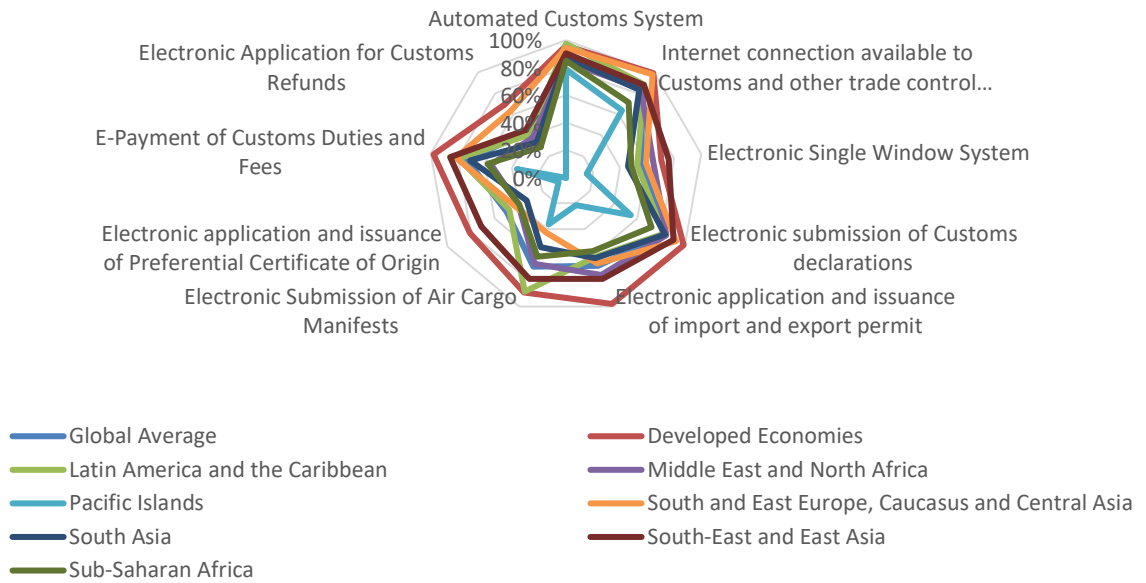
While the Pacific Islands region lags in certain measures, such as 'electronic application and issuance of preferential certificates of origin,' it achieves a commendable 79% in 'Automated Customs systems,' attributed to the adoption of UNCTAD's ASYCUDA World systems and participation in the Europe-funded IMPACT initiative for tech-driven trade facilitation. Significant implementation level differences are observed in 'electronic application and issuance of preferential certificates of origin' across regions, with developed economies demonstrating an 81% implementation rate compared to the Pacific Islands' 6%.

The voluntary nature of TFA encouragement for 'paperless trade' without mandating has resulted in implementation rates varying from 43% to 90%. Figure 8 provides a detailed breakdown of

the gaps in implementation levels for different measures in this sub-group. Notably, 99% of surveyed countries have initiated efforts to implement an 'Automated Customs System' while 95% have implemented 'Internet connection available to Customs and other trade control agencies' and 'electronic submission of Customs declarations' at least on a pilot basis. In addition, more than 85% of surveyed countries engage to some extent in 'electronic submission of Air Cargo Manifests' and 'electronic application and issuance of import and export permit'. The measure 'electronic Single Window system' is also implemented 77% of the countries but mostly on partial or pilot basis. 'Electronic application and issuance of preferential certificates of origin' and 'electronic application for Customs refunds' pose more challenges, with 68% and 56% of the surveyed countries implementing these measures to some extent, respectively.

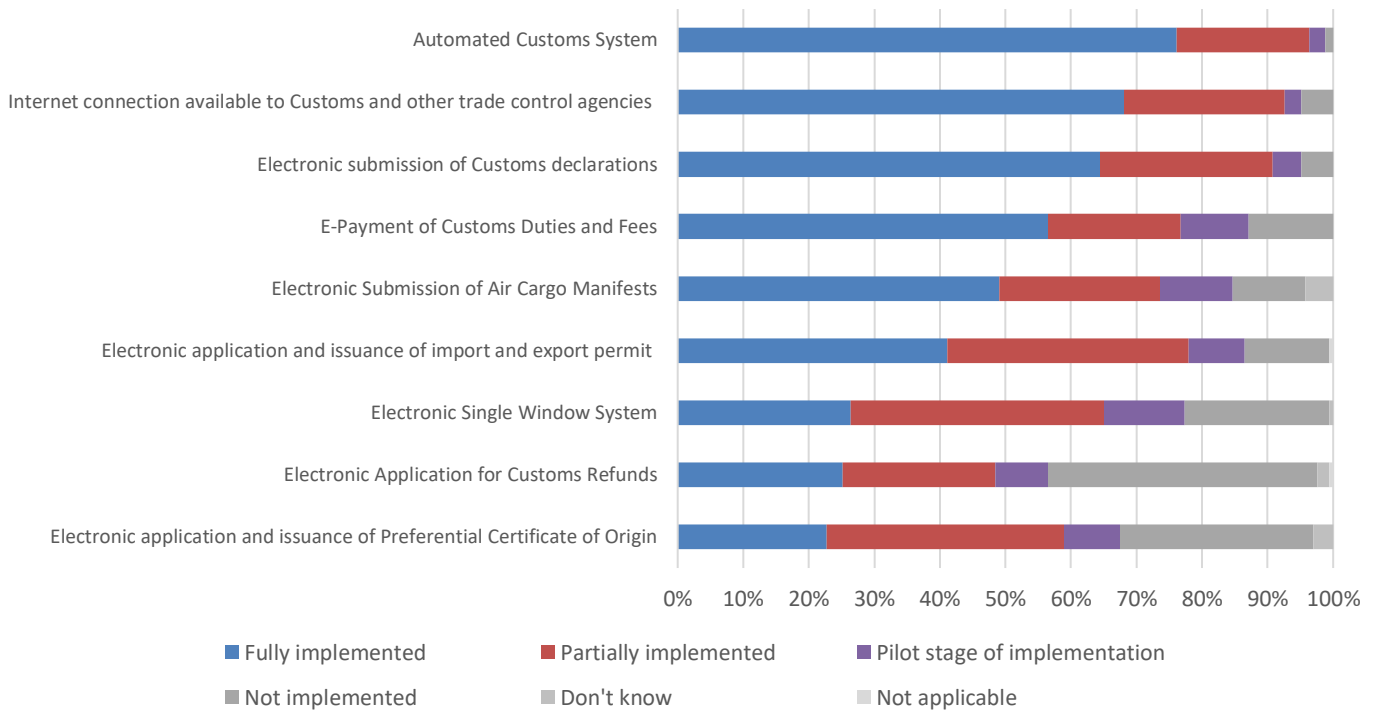
Despite these challenges, the report highlights notable progress. For instance, the Royal Oman Police (ROP) Directorate General of Customs offers the Bayan system, an online Single Window/one-stop service, streamlining administrative and logistical procedures for the trade community. Similarly, Saudi Arabia announced the second phase of implementing an E-invoicing system by the Zakat, Tax, and Customs Authority (ZATCA), aiming to modernize and streamline invoicing processes to enhance efficiency, accuracy, and compliance in tax-related activities. These examples underscore the ongoing efforts to leverage digital solutions for advancing trade facilitation and efficiency.

Figure 7: Global implementation of paperless trade measures in various regions (2023)



Source: Authors, based on data www.untfssurvey.org.

Figure 8: State of implementation of paperless trade measures globally (2023)



Source: Authors, based on data www.untfssurvey.org.

3.2. Cross-border paperless trade

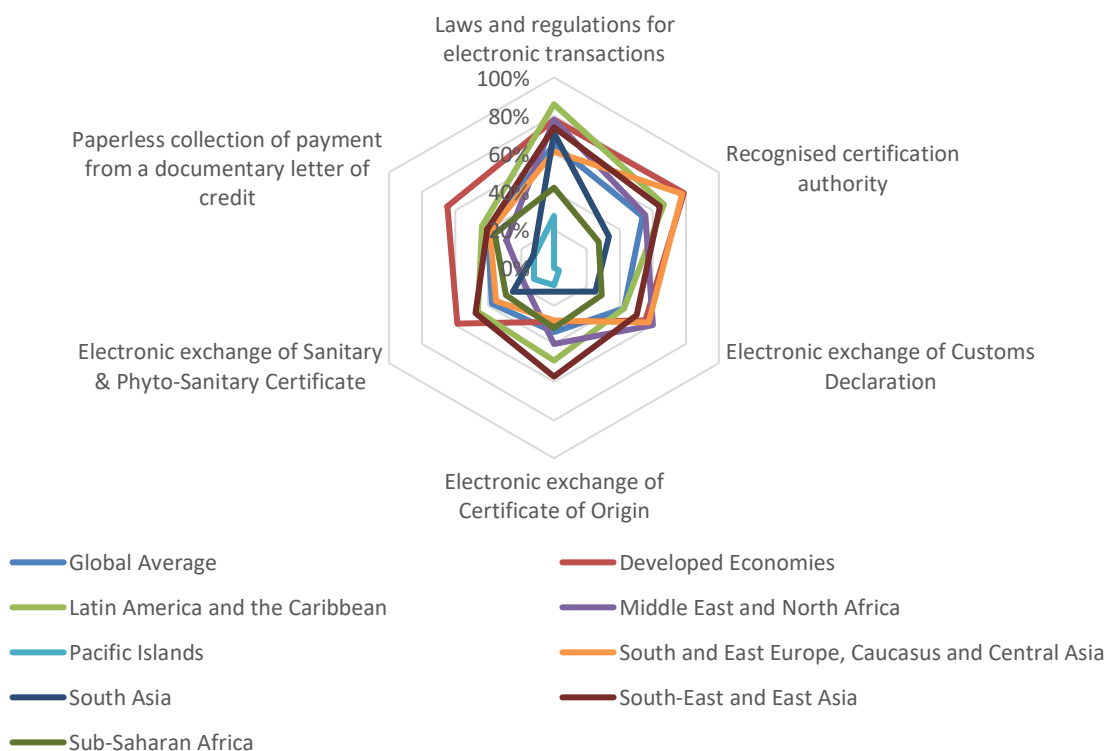
The 'cross-border paperless trade' sub-group consists of six measures, as illustrated in Figure 9. Two measures, 'laws and regulations for electronic transactions' and 'recognized certification authority,' play a pivotal role in facilitating the exchange and legal recognition of trade-related data and documents. These measures are instrumental in fostering interactions among stakeholders within a country and across the international supply chain. The remaining four measures focus on the exchange of specific trade-related data and documents across borders, forming the cornerstone for achieving a comprehensive and fully integrated paperless transformation.

Figure 9 provides an overview of average scores for implementing 'cross-border paperless trade' measures across regions, indicating a globally relatively low implementation status. The Pacific Islands region, along with Sub-Saharan Africa and South Asia to a lesser extent, faces

significant implementation challenges. Achieving "fully implemented" status for these measures often necessitates high levels of cooperation between trading partners, making it imperative to foster enhanced digital trade cooperation through regional trade agreements and facilitation initiatives.

Leaders of the TDI, such as Australia and New Zealand through PACER Plus, contribute to advancing 'cross-border paperless trade' and eliminating barriers. The African Continental Free Trade Area (AfCFTA) supports significant advancements in member countries for 'cross-border paperless trade.' In South-East and East Asia, the ASEAN Single Window excels in exchanging certificates of origin and sanitary and phytosanitary certificates (SPS). This facilitates cross-border electronic exchange of Customs declarations, certificates of origin, and SPS certificates.

Figure 9: Global implementation of cross-border paperless trade measures in various regions (2023)



Source: Authors, based on data www.unftsurvey.org.

'Laws and regulations for electronic transactions' exhibit the highest implementation rate at 65%, while other measures in the same group range from 34% to 54% implementation. Developed countries, driven by the European Union's emphasis on cross-border trade facilitation, lead in 'cross-border paperless trade' implementation. Collaborations such as the Digital Economy Partnership Agreement (DEPA) between New Zealand, Chile, and Singapore contribute to enhancing the environment for digital trade.

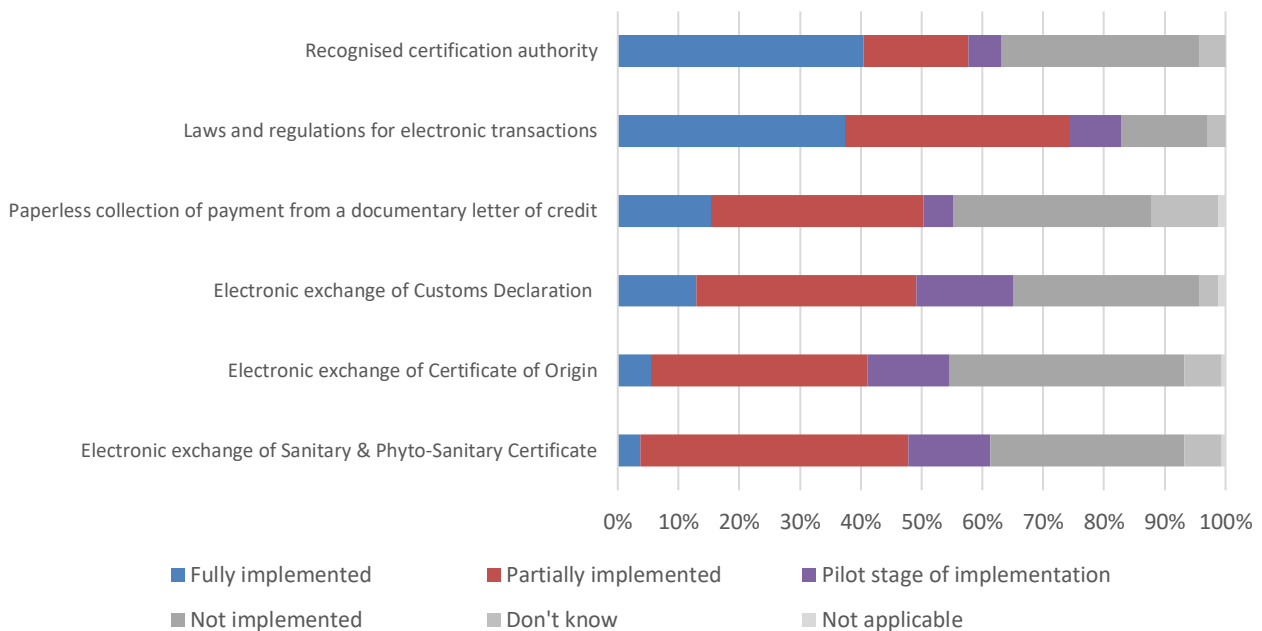
Figure 10 highlights that over 82% of surveyed countries have initiated efforts for 'laws and regulations for electronic transactions,' but only 37% have fully implemented these measures. 'Electronic exchange of Customs declaration' and 'recognized certification authority' are observed in less than 66% of countries, contributing to constraints in achieving a fully-fledged electronic exchange of trade-related data and documents, including Customs

declarations, certificates of origin, and SPS certificates.

It is important to emphasize examples of good practices, such as the Southern African Development Community (SADC) and Viet Nam. The implementation of the electronic

Certificate of Origin (eCoO) in SADC, supported by the European Union and GIZ, replaces the manual SADC Certificate of Origin, introducing online applications and real-time tracking to improve efficiency and reduce fraud. In Viet Nam, the 2022 Digital Transformation of the Customs Sector plan focuses on overhauling the national digital Customs system, integrating the National Single Window and ASEAN Single Window, and researching emerging technologies like Big Data, Intelligent Analytics, Blockchain, and Artificial Intelligence for gradual implementation in digital trade processes. These examples provide valuable insights for future developments in trade digitalization.

Figure 10: State of implementation of cross-border paperless trade measures globally (2023)



Source: Authors, based on data www.unftsurvey.org

4. Conclusion and the way forward

This paper introduced a Trade Digitalization Index (TDI) based on the UN Global Survey on Digital and Sustainable Trade Facilitation, in response to the increasing focus of policymakers on digital transformation and the digitalization of supply chains. The TDI can complement the trade facilitation implementation rates now routinely produced by the five regional commissions and UNCTAD on the basis of the survey, providing a useful metrics to be incorporated in broader digital economy frameworks.

This first version of the TDI, built on a set of 15 paperless trade and cross-border paperless trade measures, highlighted very diverse levels of implementation across the 163 countries covered and the existence of a trade digitalization gap between high and low-income countries. With a global average implementation rate standing at 59% for 2023, much remains to be done, particularly in the area of 'cross-border paperless trade'.

Benefits of cross-border paperless trade are already well documented⁸, but the challenges faced by countries in achieving it are substantial, ranging from the imperative use of common international standards to the harmonization of different legal frameworks. Capacity gaps, especially in LDCs and LLDCs, pose significant obstacles, necessitating experiences and knowledge in relevant technologies and skills for successful implementation. Cooperation between the public and private sectors, as well as the absence of coordination mechanisms for cross-border data exchange, further complicate the landscape.

For many developing countries, establishing paperless systems remains a challenge, while

developed countries encounter hurdles in making their systems interoperable with partner nations to facilitate cross-border paperless trade. The way forward involves setting up institutional arrangements to prioritize and coordinate relevant measures, enhancing transparency by sharing information on existing laws, regulations, and procedures related to digitalization, and seeking stakeholder input for developing new policies and electronic document exchange solutions that align with international standards. The Framework Agreement on Facilitation of Cross-Border Paperless Trade in Asia and the Pacific is an example of such arrangements, and arguably the largest and most inclusive to date. This UN treaty entered into force in 2021, providing an intergovernmental platform solely dedicated to accelerating trade digitalization among countries of Asia and the Pacific; it may be leveraged in other world regions as well.⁹

Promoting close collaboration between countries through intergovernmental agreements at various levels is essential for facilitating cross-border paperless trade. These efforts should underscore the practicalities of implementation, emphasizing the need for collaborative initiatives beyond individual countries. This involves building on existing international standards conducting pilot tests for different mechanisms and solutions, and exploring possibilities through a new ESCAP-ICC Cross-border Paperless Trade Database accessible at www.digitalizetrade.org. These measures collectively aim to propel global trade digitalization forward, fostering interoperability and ensuring the seamless exchange of data and documents in the digital era. The WTO-ESCAP-UNCITRAL Cross-Border Paperless Trade Toolkit (2022), as well as the WTO-ICC

⁸ See for example: <https://www.unftsurvey.org/files/documents/report-digital-sustainable-2023-global.pdf>; <https://www.adb.org/publications/asia-pacific-trade-facilitation-report-2021>; López González, J., S. Sorescu

and P. Kaynak (2023), "Of bytes and trade: Quantifying the impact of digitalisation on trade", OECD Trade Policy Papers, No. 273, OECD Publishing, Paris, <https://doi.org/10.1787/11889f2a-en>.

⁹ <https://www.unescap.org/projects/cpta>

Standards Toolkit for cross-border paperless trade (2021) both provide useful guidance for moving forward.

The development of more and better metrics on trade digitalization should continue, to encourage countries to accelerate progress in this important area. The TDI presented in this

paper is a first version and may be developed further, preferably in cooperation with a wide range of other organizations and stakeholders involved in this field. Analysis of the impact of trade digitalization – and broader digital transformation – using this new tool is encouraged.

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Databases

ESCAP-ICC Cross-border Paperless Trade Database. www.digitalizetrade.org

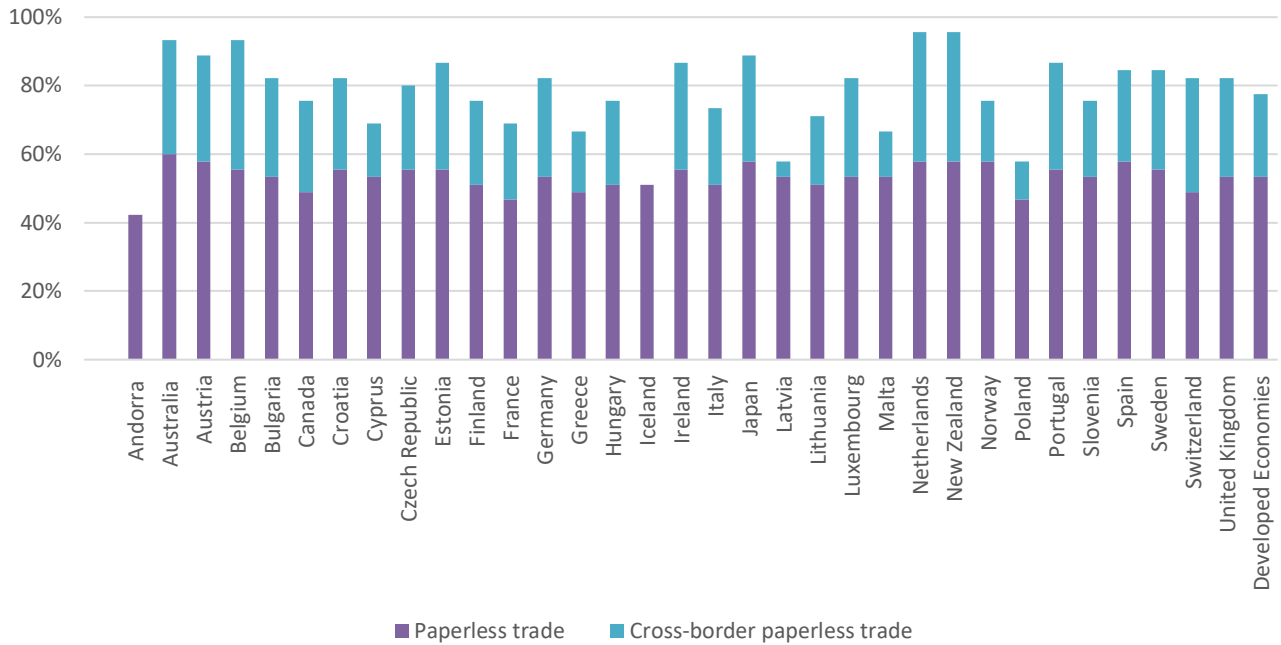
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Annex 1: Trade digitalization by countries in different groups (%)

Annex figure 1: Average implementation rates of trade digitalization in Developed Economies



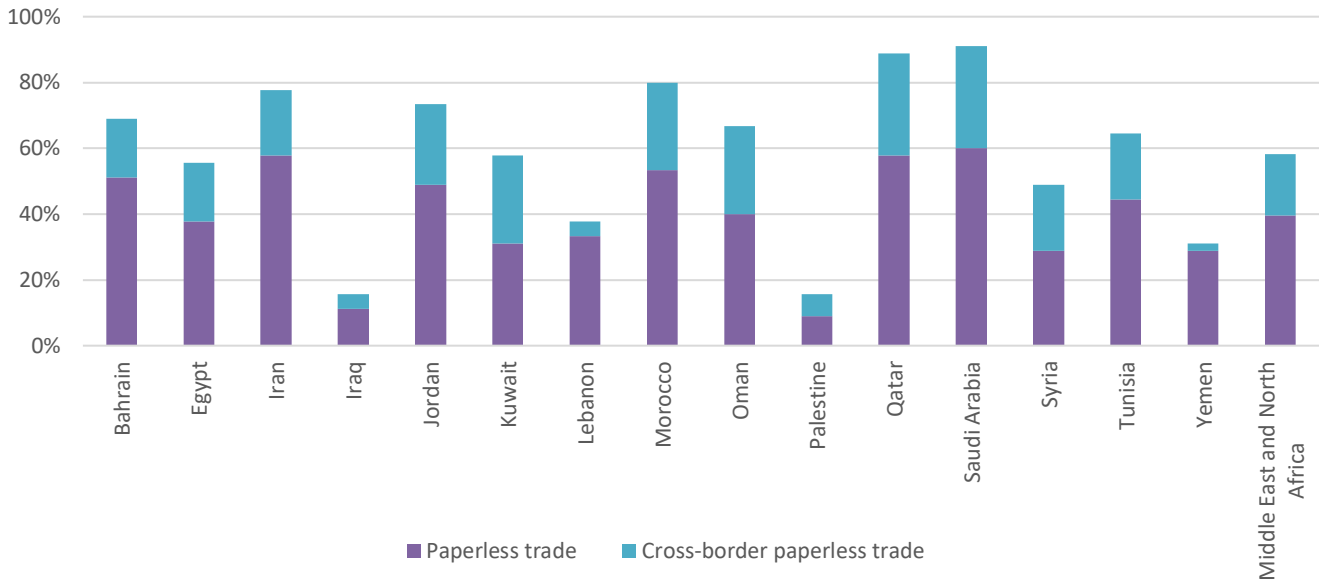
Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023. Available at untfsurvey.org

Annex figure 2: Average implementation rates of trade digitalization in Latin America and the Caribbean



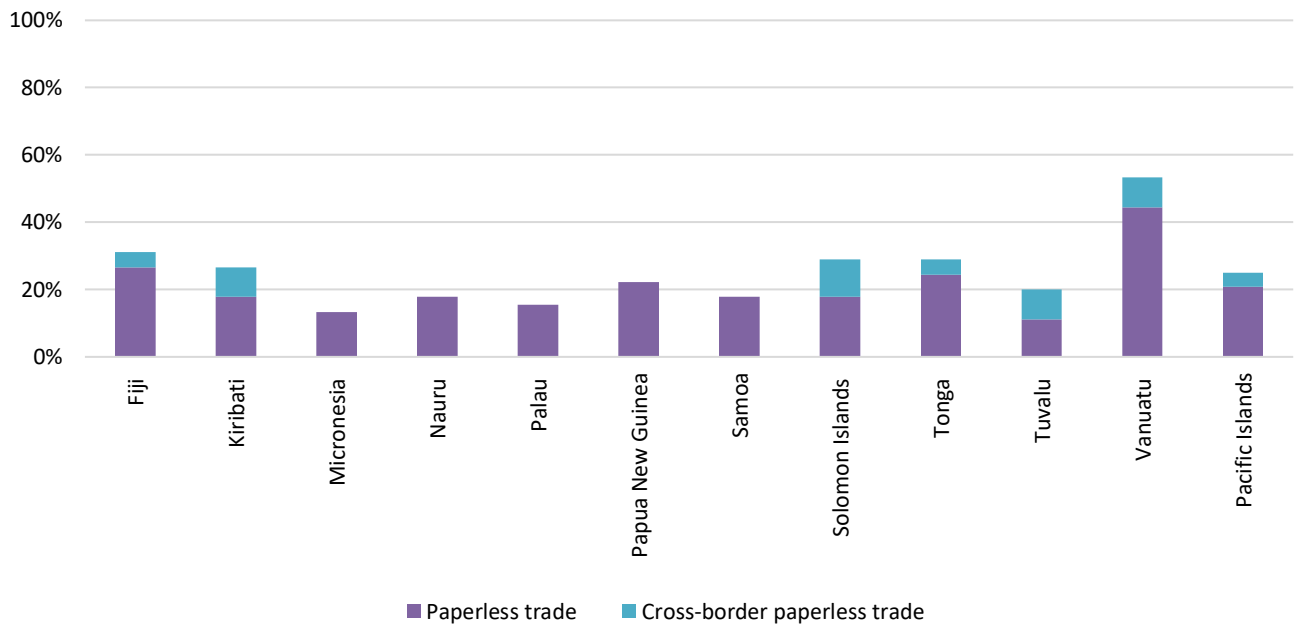
Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023. Available at untfsurvey.org

Annex figure 3: Average implementation rates of trade digitalization in the Middle East and North Africa



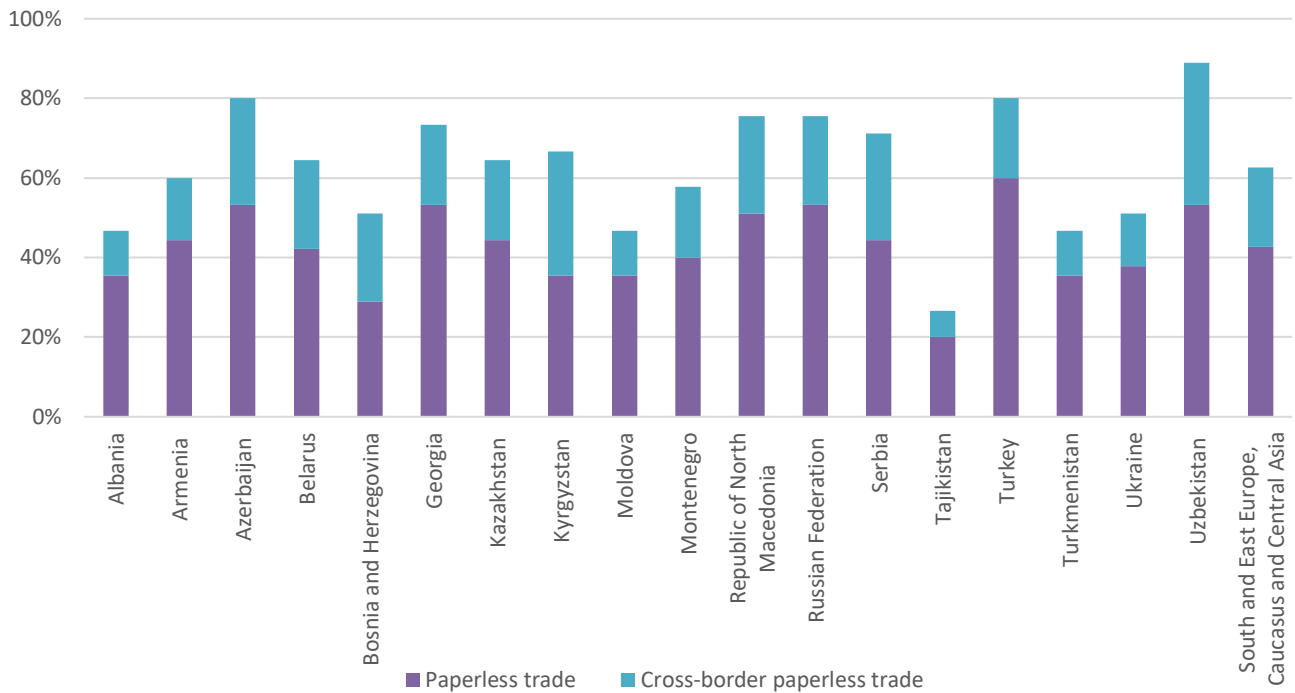
Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023. Available at untfsurvey.org

Annex figure 4: Average implementation rates of trade digitalization in the Pacific Islands



Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023. Available at untfsurvey.org

Annex figure 5: Average implementation rates of trade digitalization in South and East Europe, Caucasus and Central Asia



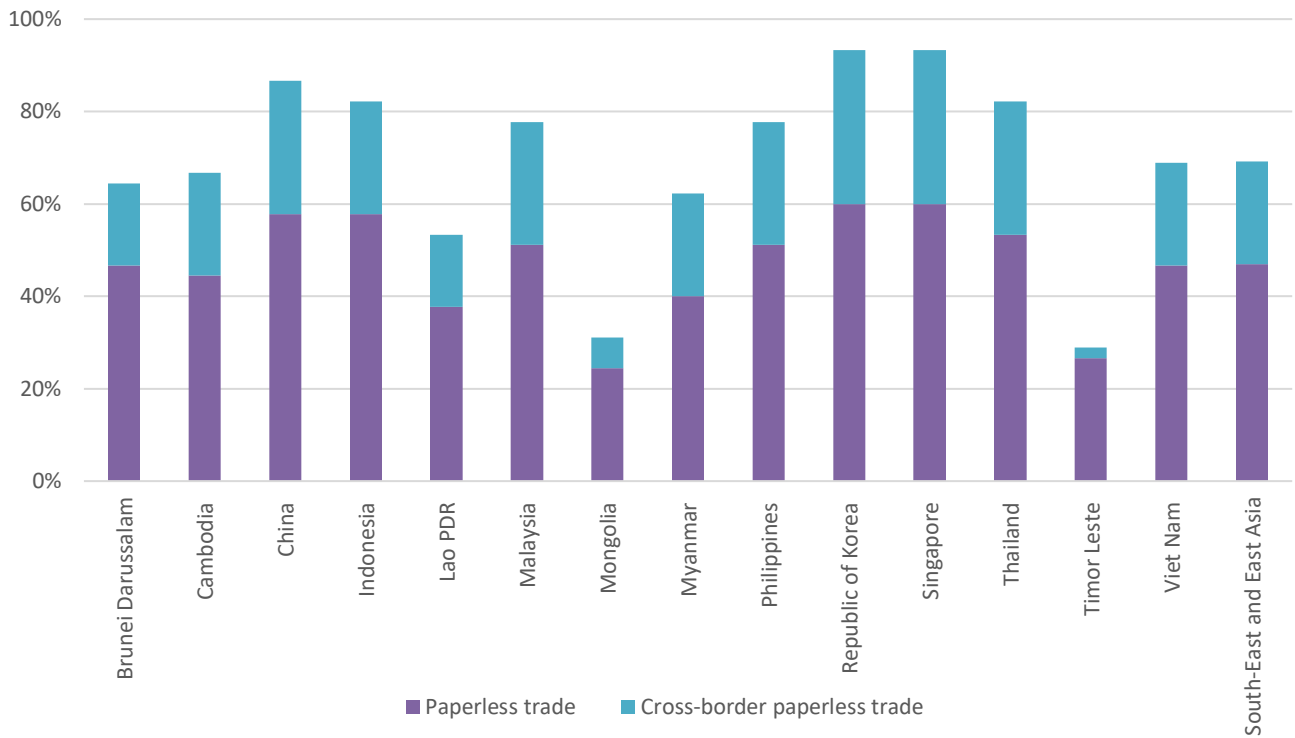
Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023. Available at [untdc.org](https://untdc.org/untdc-survey)

Annex figure 6: Average implementation rates of trade digitalization in South Asia



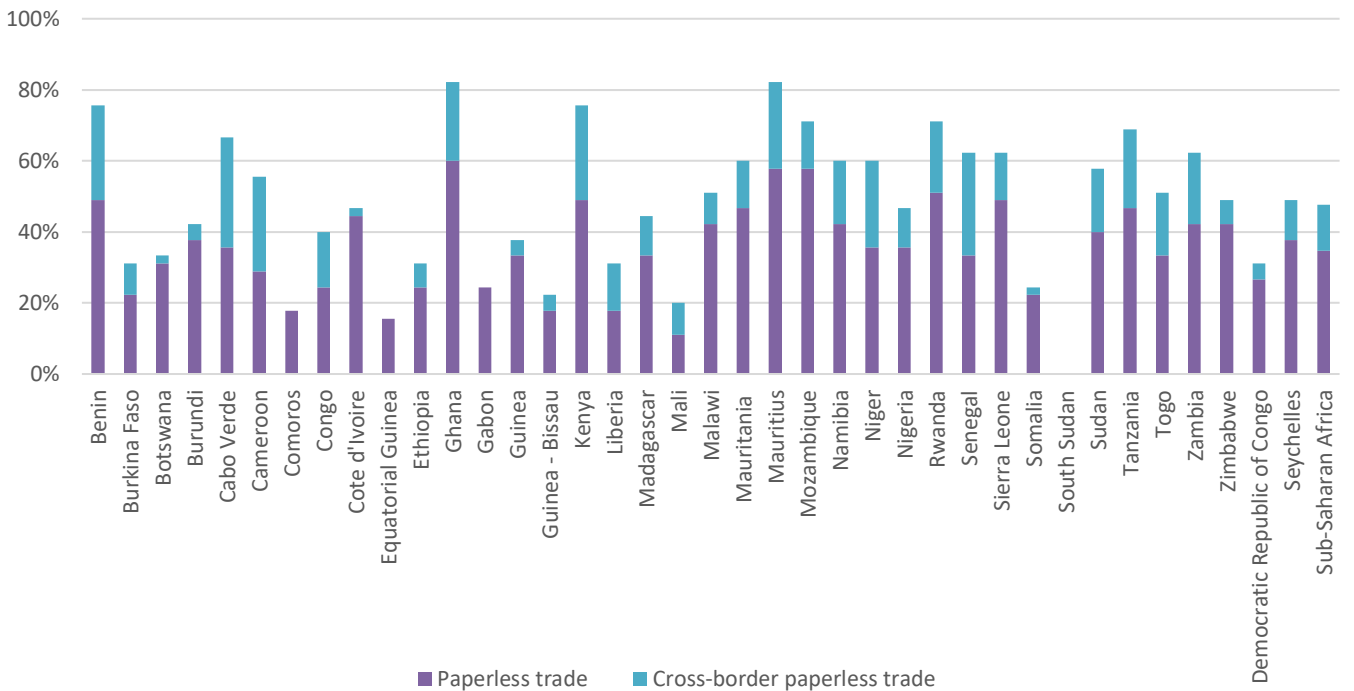
Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023. Available at [untdc.org](https://untdc.org/untdc-survey)

Annex figure 7: Average implementation rates of trade digitalization in South-East and East Asia



Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023. Available at untfsurvey.org

Annex figure 8: Average implementation rates of trade digitalization in Sub-Saharan Africa



Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023. Available at untfsurvey.org

Annex 2: Trade digitalization by countries in different groups (%)¹⁰

Annex Table 1: Average implementation rates of trade digitalization in Developed Economies

| Developed economies | 2023 | | | 2021 | | |
|---------------------|----------------------------------|----------------------|------------------------------------|----------------------------------|----------------------|------------------------------------|
| | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) |
| Andorra | 42.22% | 42.22 | 0.00 | 42.22% | 42.22 | 0.00 |
| Australia | 93.33% | 60.00 | 33.33 | 93.33% | 60.00 | 33.33 |
| Austria | 88.89% | 57.78 | 31.11 | 86.67% | 55.56 | 31.11 |
| Belgium | 93.33% | 55.56 | 37.78 | 91.11% | 53.33 | 37.78 |
| Bulgaria | 82.22% | 53.33 | 28.89 | 82.22% | 53.33 | 28.89 |
| Canada | 75.56% | 48.89 | 26.67 | 73.33% | 46.67 | 26.67 |
| Croatia | 82.22% | 55.56 | 26.67 | 71.11% | 51.11 | 20.00 |
| Cyprus | 68.89% | 53.33 | 15.56 | 55.56% | 46.67 | 8.89 |
| Czech Republic | 80.00% | 55.56 | 24.44 | 77.78% | 53.33 | 24.44 |
| Estonia | 86.67% | 55.56 | 31.11 | 77.78% | 48.89 | 28.89 |
| Finland | 75.56% | 51.11 | 24.44 | 75.56% | 51.11 | 24.44 |
| France | 68.89% | 46.67 | 22.22 | 68.89% | 46.67 | 22.22 |
| Germany | 82.22% | 53.33 | 28.89 | 77.78% | 51.11 | 26.67 |
| Greece | 66.67% | 48.89 | 17.78 | 51.11% | 37.78 | 13.33 |
| Hungary | 75.56% | 51.11 | 24.44 | 60.00% | 40.00 | 20.00 |
| Iceland | 51.11% | 51.11 | 0.00 | N/A | N/A | N/A |
| Ireland | 86.67% | 55.56 | 31.11 | 80.00% | 53.33 | 26.67 |
| Italy | 73.33% | 51.11 | 22.22 | 73.33% | 51.11 | 22.22 |
| Japan | 88.89% | 57.78 | 31.11 | 88.89% | 57.78 | 31.11 |
| Latvia | 57.78% | 53.33 | 4.44 | N/A | N/A | N/A |
| Lithuania | 71.11% | 51.11 | 20.00 | 64.44% | 48.89 | 15.56 |
| Luxembourg | 82.22% | 53.33 | 28.89 | 37.78% | 28.89 | 8.89 |
| Malta | 66.67% | 53.33 | 13.33 | 57.78% | 48.89 | 8.89 |
| Netherlands | 95.56% | 57.78 | 37.78 | 88.89% | 55.56 | 33.33 |
| New Zealand | 95.56% | 57.78 | 37.78 | 95.56% | 57.78 | 37.78 |
| Norway | 75.56% | 57.78 | 17.78 | 73.33% | 55.56 | 17.78 |
| Poland | 57.78% | 46.67 | 11.11 | 55.56% | 44.44 | 11.11 |
| Portugal | 86.67% | 55.56 | 31.11 | 73.33% | 46.67 | 26.67 |
| Slovenia | 75.56% | 53.33 | 22.22 | N/A | N/A | N/A |
| Spain | 84.44% | 57.78 | 26.67 | 82.22% | 57.78 | 24.44 |
| Sweden | 84.44% | 55.56 | 28.89 | 62.22% | 42.22 | 20.00 |
| Switzerland | 82.22% | 48.89 | 33.33 | 82.22% | 48.89 | 33.33 |
| United Kingdom | 82.22% | 53.33 | 28.89 | 75.56% | 51.11 | 24.44 |

Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023.

Available at untfsurvey.org

Note: Paperless trade (PT) and cross-border paperless trade (CPT) show the percentage points contributed by PT and CPT measures, respectively, to the TDI. The maximum value for PT is 60 and CPT is 40 percentage points. N/A means data is not available.

¹⁰ The 2023 TDI data encompasses a total of 163 countries, of which 144 were also included in the 2021 data. The analysis focuses exclusively on countries covered in both years to facilitate a comparative assessment of progress in implementing trade digitalization measures over the previous two years.

Annex Table 2: Average implementation rates of trade digitalization in Latin America and the Caribbean

| Latin America and the Caribbean | 2023 | | | 2021 | | |
|----------------------------------|----------------------------------|----------------------|------------------------------------|----------------------------------|----------------------|------------------------------------|
| | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) |
| Antigua & Barbuda | 44.44% | 26.67 | 17.78 | 24.44% | 15.56 | 8.89 |
| Argentina | 77.78% | 48.89 | 28.89 | 77.78% | 48.89 | 28.89 |
| Belize | 40.00% | 31.11 | 8.89 | 35.56% | 31.11 | 4.44 |
| Bolivia | 48.89% | 35.56 | 13.33 | N/A | N/A | N/A |
| Brazil | 91.11% | 57.78 | 33.33 | 77.78% | 57.78 | 20.00 |
| Chile | 82.22% | 53.33 | 28.89 | 75.56% | 53.33 | 22.22 |
| Colombia | 75.56% | 51.11 | 24.44 | 75.56% | 51.11 | 24.44 |
| Costa Rica | 80.00% | 48.89 | 31.11 | 68.89% | 42.22 | 26.67 |
| Cuba | 42.22% | 31.11 | 11.11 | 37.78% | 26.67 | 11.11 |
| Dominican Republic | 80.00% | 51.11 | 28.89 | 64.44% | 48.89 | 15.56 |
| Ecuador | 77.78% | 51.11 | 26.67 | 77.78% | 51.11 | 26.67 |
| El Salvador | 71.11% | 46.67 | 24.44 | 53.33% | 37.78 | 15.56 |
| Guatemala | 64.44% | 44.44 | 20.00 | 62.22% | 44.44 | 17.78 |
| Guyana | 42.22% | 26.67 | 15.56 | 13.33% | 11.11 | 2.22 |
| Honduras | 60.00% | 33.33 | 26.67 | N/A | N/A | N/A |
| Jamaica | 77.78% | 55.56 | 22.22 | N/A | N/A | N/A |
| Mexico | 86.67% | 55.56 | 31.11 | 86.67% | 55.56 | 31.11 |
| Nicaragua | 46.67% | 33.33 | 13.33 | N/A | N/A | N/A |
| Panama | 68.89% | 42.22 | 26.67 | 66.67% | 42.22 | 24.44 |
| Paraguay | 75.56% | 44.44 | 31.11 | 62.22% | 44.44 | 17.78 |
| Peru | 91.11% | 60.00 | 31.11 | 80.00% | 57.78 | 22.22 |
| Saint Lucia | 42.22% | 31.11 | 11.11 | N/A | N/A | N/A |
| Saint Kitts and Nevis | 44.44% | 33.33 | 11.11 | 44.44% | 33.33 | 11.11 |
| Saint Vincent and the Grenadines | 40.00% | 31.11 | 8.89 | 20.00% | 20.00 | 0.00% |
| Trinidad and Tobago | 60.00% | 37.78 | 22.22 | 37.78% | 33.33 | 4.44 |
| Uruguay | 73.33% | 44.44 | 28.89% | 73.33% | 44.44 | 28.89 |

Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023.

Available at untfsurvey.org

Note: Paperless trade (PT) and cross-border paperless trade (CPT) show the percentage points contributed by PT and CPT measures, respectively, to the TDI. The maximum value for PT is 60 and CPT is 40 percentage points. N/A means data is not available.

Annex Table 3: Average implementation rates of trade digitalization in Middle East and North Africa

| Middle East and North Africa | 2023 | | | 2021 | | |
|------------------------------|----------------------------------|----------------------|------------------------------------|----------------------------------|----------------------|------------------------------------|
| | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) |
| Bahrain | 68.89% | 51.11 | 17.78 | 44.44% | 44.44 | 0.00 |
| Egypt | 55.56% | 37.78 | 17.78 | 26.67% | 22.22 | 4.44 |
| Iran | 77.78% | 57.78 | 20.00 | 77.78% | 57.78 | 20.00 |
| Iraq | 15.56% | 11.11 | 4.44 | 2.22% | 0.00 | 2.22 |
| Jordan | 73.33% | 48.89 | 24.44 | 55.56% | 44.44 | 11.11 |
| Kuwait | 57.78% | 31.11 | 26.67 | N/A | N/A | N/A |
| Lebanon | 37.78% | 33.33 | 4.44 | 28.89% | 28.89 | 0.00 |
| Morocco | 80.00% | 53.33 | 26.67 | 77.78% | 53.33 | 24.44 |
| Oman | 66.67% | 40.00 | 26.67 | N/A | N/A | N/A |
| Palestine | 15.56% | 8.89 | 6.67 | 13.33% | 11.11 | 2.22 |
| Qatar | 88.89% | 57.78 | 31.11 | N/A | N/A | N/A |
| Saudi Arabia | 91.11% | 60.00 | 31.11 | 71.11% | 46.67 | 24.44 |
| Syria | 48.89% | 28.89 | 20.00 | 48.89% | 28.89 | 20.00 |
| Tunisia | 64.44% | 44.44 | 20.00 | 64.44% | 44.44 | 20.00 |
| Yemen | 31.11% | 28.89 | 2.22 | N/A | N/A | N/A |

Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023.

Available at untfsurvey.org

Note: Paperless trade (PT) and cross-border paperless trade (CPT) show the percentage points contributed by PT and CPT measures, respectively, to the TDI. The maximum value for PT is 60 and CPT is 40 percentage points. N/A means data is not available.

Annex Table 4: Average implementation rates of trade digitalization in Pacific Islands

| Pacific Islands | 2023 | | | 2021 | | |
|------------------|----------------------------------|----------------------|------------------------------------|----------------------------------|----------------------|------------------------------------|
| | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) |
| Fiji | 31.11% | 26.67 | 4.44 | 26.67% | 24.44 | 2.22 |
| Kiribati | 26.67% | 17.78 | 8.89 | 4.44% | 4.44 | 0.00 |
| Micronesia | 13.33% | 13.33 | 0.00 | 13.33% | 13.33 | 0.00 |
| Nauru | 17.78% | 17.78 | 0.00 | 17.78% | 17.78 | 0.00 |
| Palau | 15.56% | 15.56 | 0.00 | 15.56% | 15.56 | 0.00 |
| Papua New Guinea | 22.22% | 22.22 | 0.00 | 17.78% | 17.78 | 0.00 |
| Samoa | 17.78% | 17.78 | 0.00 | 17.78% | 17.78 | 0.00 |
| Solomon Islands | 28.89% | 17.78 | 11.11 | 28.89% | 17.78 | 11.11 |
| Tonga | 28.89% | 24.44 | 4.44 | 24.44% | 20.00 | 4.44 |
| Tuvalu | 20.00% | 11.11 | 8.89 | 15.56% | 8.89 | 6.67 |
| Vanuatu | 53.33% | 44.44 | 8.89 | 53.33% | 44.44% | 8.89 |

Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023.

Available at untfsurvey.org

Note: Paperless trade (PT) and cross-border paperless trade (CPT) show the percentage points contributed by PT and CPT measures, respectively, to the TDI. The maximum value for PT is 60 and CPT is 40 percentage points. N/A means data is not available.

Annex Table 5: Average implementation rates of trade digitalization in South and East Europe, Caucasus and Central Asia

| South and East Europe, Caucasus and Central Asia | 2023 | | | 2021 | | |
|--|----------------------------------|----------------------|------------------------------------|----------------------------------|----------------------|------------------------------------|
| | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) |
| Albania | 46.67% | 35.56 | 11.11 | 44.44% | 35.56 | 8.89 |
| Armenia | 60.00% | 44.44 | 15.56 | 51.11% | 35.56 | 15.56 |
| Azerbaijan | 80.00% | 53.33 | 26.67 | 77.78% | 51.11 | 26.67 |
| Belarus | 64.44% | 42.22 | 22.22 | 64.44% | 42.22 | 22.22 |
| Bosnia and Herzegovina | 51.11% | 28.89 | 22.22 | 24.44% | 17.78 | 6.67 |
| Georgia | 73.33% | 53.33 | 20.00 | 66.67% | 51.11 | 15.56 |
| Kazakhstan | 64.44% | 44.44 | 20.00 | 55.56% | 40.00 | 15.56 |
| Kyrgyzstan | 66.67% | 35.56 | 31.11 | 64.44% | 33.33 | 31.11 |
| Moldova | 46.67% | 35.56 | 11.11 | 46.67% | 35.56 | 11.11 |
| Montenegro | 57.78% | 40.00 | 17.78 | 53.33% | 37.78 | 15.56 |
| Republic of North Macedonia | 75.56% | 51.11 | 24.44 | 68.89% | 51.11 | 17.78 |
| Russian Federation | 75.56% | 53.33 | 22.22 | 71.11% | 48.89 | 22.22 |
| Serbia | 71.11% | 44.44 | 26.67 | 60.00% | 40.00 | 20.00 |
| Tajikistan | 26.67% | 20.00 | 6.67 | 26.67% | 20.00 | 6.67 |
| Turkey | 80.00% | 60.00 | 20.00 | 77.78% | 57.78 | 20.00 |
| Turkmenistan | 46.67% | 35.56 | 11.11 | N/A | N/A | N/A |
| Ukraine | 51.11% | 37.78 | 13.33 | 51.11% | 37.78 | 13.33 |
| Uzbekistan | 88.89% | 53.33 | 35.56 | 57.78% | 44.44 | 13.33 |

Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023. Available at [untdi.org](https://untdi.org/untdi/survey)

Note: Paperless trade (PT) and cross-border paperless trade (CPT) show the percentage points contributed by PT and CPT measures, respectively, to the TDI. The maximum value for PT is 60 and CPT is 40 percentage points. N/A means data is not available.

Annex Table 6: Average implementation rates of trade digitalization in South Asia

| South Asia | 2023 | | | 2021 | | |
|-------------|----------------------------------|----------------------|------------------------------------|----------------------------------|----------------------|------------------------------------|
| | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) |
| Afghanistan | 17.78% | 11.11 | 6.67 | 15.56% | 8.89 | 6.67 |
| Bangladesh | 46.67% | 35.56 | 11.11 | 46.67% | 35.56 | 11.11 |
| Bhutan | 26.67% | 20.00 | 6.67 | 22.22% | 15.56 | 6.67 |
| India | 86.67% | 60.00 | 26.67 | 84.44% | 57.78 | 26.67 |
| Maldives | 42.22% | 40.00 | 2.22 | 40.00% | 40.00 | 0.00 |
| Nepal | 53.33% | 42.22 | 11.11 | 44.44% | 37.78 | 6.67 |
| Pakistan | 68.89% | 51.11 | 17.78 | 44.44% | 35.56 | 8.89 |
| Sri Lanka | 48.89% | 35.56 | 13.33 | 48.89% | 35.56 | 13.33 |

Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023. Available at [untdi.org](https://untdi.org/untdi/survey)

Note: Paperless trade (PT) and cross-border paperless trade (CPT) show the percentage points contributed by PT and CPT measures, respectively, to the TDI. The maximum value for PT is 60 and CPT is 40 percentage points. N/A means data is not available.

Annex Table 7: Average implementation rates of trade digitalization in South-East and East Asia

| South-East and East Asia | 2023 | | | 2021 | | |
|--------------------------|----------------------------------|----------------------|------------------------------------|----------------------------------|----------------------|------------------------------------|
| | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) |
| Brunei Darussalam | 64.44% | 46.67 | 17.78 | 64.44% | 46.67 | 17.78 |
| Cambodia | 66.67% | 44.44 | 22.22 | 62.22% | 40.00 | 22.22 |
| China | 86.67% | 57.78 | 28.89 | 86.67% | 57.78 | 28.89 |
| Indonesia | 82.22% | 57.78 | 24.44 | 77.78% | 57.78 | 20.00 |
| Lao PDR | 53.33% | 37.78 | 15.56 | 48.89% | 33.33 | 15.56 |
| Malaysia | 77.78% | 51.11 | 26.67 | 75.56% | 51.11 | 24.44 |
| Mongolia | 31.11% | 24.44 | 6.67 | 24.44% | 20.00 | 4.44 |
| Myanmar | 62.22% | 40.00 | 22.22 | 62.22% | 40.00 | 22.22 |
| Philippines | 77.78% | 51.11 | 26.67 | 75.56% | 51.11 | 24.44 |
| Republic of Korea | 93.33% | 60.00 | 33.33 | 91.11% | 60.00 | 31.11 |
| Singapore | 93.33% | 60.00 | 33.33 | 91.11% | 60.00 | 31.11 |
| Thailand | 82.22% | 53.33 | 28.89 | 82.22% | 53.33 | 28.89 |
| Timor Leste | 28.89% | 26.67 | 2.22 | 20.00% | 20.00 | 0.00 |
| Viet Nam | 68.89% | 46.67 | 22.22 | 55.56% | 35.56 | 20.00 |

Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023. Available at untfsurvey.org

Note: Paperless trade (PT) and cross-border paperless trade (CPT) show the percentage points contributed by PT and CPT measures, respectively, to the TDI. The maximum value for PT is 60 and CPT is 40 percentage points. N/A means data is not available.

Annex Table 8: Average implementation rates of trade digitalization in Sub-Saharan Africa

| Sub-Saharan Africa | 2023 | | | 2021 | | |
|------------------------------|----------------------------------|----------------------|------------------------------------|----------------------------------|----------------------|------------------------------------|
| | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) |
| Benin | 75.56% | 48.89 | 26.67 | N/A | N/A | N/A |
| Burkina Faso | 31.11% | 22.22 | 8.89 | 24.44% | 20.00 | 4.44 |
| Botswana | 33.33% | 31.11 | 2.22 | 24.44% | 22.22 | 2.22 |
| Burundi | 42.22% | 37.78 | 4.44 | 42.22% | 37.78 | 4.44 |
| Cabo Verde | 66.67% | 35.56 | 31.11 | 22.22% | 22.22 | 0.00 |
| Cameroon | 55.56% | 28.89 | 26.67 | 48.89% | 28.89 | 20.00 |
| Comoros | 17.78% | 17.78 | 0.00 | 17.78% | 17.78 | 0.00 |
| Congo | 40.00% | 24.44 | 15.56 | 40.00% | 24.44 | 15.56 |
| Cote d'Ivoire | 46.67% | 44.44 | 2.22 | 46.67% | 44.44 | 2.22 |
| Democratic Republic of Congo | 31.11% | 26.67 | 4.44 | N/A | N/A | N/A |
| Equatorial Guinea | 15.56% | 15.56 | 0.00 | 15.56% | 15.56 | 0.00 |
| Ethiopia | 31.11% | 24.44 | 6.67 | 4.44% | 4.44 | 0.00 |
| Ghana | 82.22% | 60.00 | 22.22 | N/A | N/A | N/A |
| Gabon | 24.44% | 24.44 | 0.00 | 24.44% | 24.44 | 0.00 |
| Guinea | 37.78% | 33.33 | 4.44 | 22.22% | 17.78 | 4.44 |
| Guinea - Bissau | 22.22% | 17.78 | 4.44 | 22.22% | 17.78 | 4.44 |
| Kenya | 75.56% | 48.89 | 26.67 | 73.33% | 48.89 | 24.44 |
| Liberia | 31.11% | 17.78 | 13.33 | N/A | N/A | N/A |
| Madagascar | 44.44% | 33.33 | 11.11 | 24.44% | 24.44 | 0.00 |
| Mali | 20.00% | 11.11 | 8.89 | N/A | N/A | N/A |
| Malawi | 51.11% | 42.22 | 8.89 | 37.78% | 33.33 | 4.44 |
| Mauritania | 60.00% | 46.67 | 13.33 | 60.00% | 46.67 | 13.33 |
| Mauritius | 82.22% | 57.78 | 24.44 | 82.22% | 57.78 | 24.44 |
| Mozambique | 71.11% | 57.78 | 13.33 | 64.44% | 57.78 | 6.67 |
| Namibia | 60.00% | 42.22 | 17.78 | 37.78% | 35.56 | 2.22 |
| Niger | 60.00% | 35.56 | 24.44 | 28.89% | 11.11 | 17.78 |
| Nigeria | 46.67% | 35.56 | 11.11 | 35.56% | 26.67 | 8.89 |
| Rwanda | 71.11% | 51.11 | 20.00 | 62.22% | 51.11 | 11.11 |
| Senegal | 62.22% | 33.33 | 28.89 | 48.89% | 26.67 | 22.22 |
| Seychelles | 48.89% | 37.78 | 11.11 | N/A | N/A | N/A |
| Sierra Leone | 62.22% | 48.89 | 13.33 | 26.67% | 26.67 | 0.00 |
| Somalia | 24.44% | 22.22 | 2.22 | 6.67% | 6.67 | 0.00 |
| South Sudan | 0.00% | 0.00 | 0.00 | 0.00% | 0.00 | 0.00 |
| Sudan | 57.78% | 40.00 | 17.78 | 51.11% | 33.33 | 17.78 |
| Tanzania | 68.89% | 46.67 | 22.22 | 35.56% | 26.67 | 8.89 |
| Togo | 51.11% | 33.33 | 17.78 | 51.11% | 33.33 | 17.78 |
| Zambia | 62.22% | 42.22 | 20.00 | 46.67% | 31.11 | 15.56 |
| Zimbabwe | 48.89% | 42.22 | 6.67 | 31.11% | 24.44 | 6.67 |

Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023.

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Note: Paperless trade (PT) and cross-border paperless trade (CPT) show the percentage points contributed by PT and CPT measures, respectively, to the TDI. The maximum value for PT is 60 and CPT is 40 percentage points. N/A means data is not available.

Annex Table 9: Average regional and global implementation rates of trade digitalization

| Region/Group | 2023 | | | 2021 | | |
|--|----------------------------------|----------------------|------------------------------------|----------------------------------|----------------------|------------------------------------|
| | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) | Trade digitalization index (TDI) | Paperless trade (PT) | Cross-border paperless trade (CPT) |
| Developed Economies | 79.19% | 53.41 | 25.78 | 72.52% | 49.56 | 22.96 |
| Latin America and the Caribbean | 67.09% | 43.70 | 23.39 | 57.88% | 40.53 | 17.35 |
| Middle East and North Africa | 57.17% | 39.60 | 17.58 | 46.46% | 34.75 | 11.72 |
| Pacific Islands | 25.05% | 20.81 | 4.24 | 21.41% | 18.38 | 3.03 |
| South and East Europe, Caucasus and Central Asia | 63.53% | 43.14 | 20.39 | 56.60% | 40.00 | 16.60 |
| South Asia | 48.89% | 36.94 | 11.94 | 43.33% | 33.33 | 10.00 |
| South-East and East Asia | 69.21% | 46.98 | 22.22 | 65.56% | 44.76 | 20.79 |
| Sub-Saharan Africa | 47.64% | 34.93 | 12.71 | 36.25% | 28.13 | 8.13 |
| Global Average | 60.09% | 41.59 | 18.50 | 52.25% | 37.47 | 14.78 |
| LDCs | 43.87% | 31.97 | 11.90 | 33.84% | 25.38 | 8.46 |
| LLDCs | 49.91% | 35.28 | 14.63 | 40.37% | 29.44 | 10.93 |
| SIDS | 39.32% | 28.97 | 10.34 | 31.11% | 25.30 | 5.81 |
| Full score | 100.00% | 60.00 | 40.00 | 100.00% | 60.00 | 40.00 |

Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023.

Available at untfsurvey.org

Note: Paperless trade (PT) and cross-border paperless trade (CPT) show the percentage points contributed by PT and CPT measures, respectively, to the TDI. The maximum value for PT is 60 and CPT is 40 percentage points. N/A means data is not available.