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## Securing cross-border trade through advanced technologies



**Advanced technologies have already begun to automate global supply chains. However, the scope and potential for using the latest technology to further facilitate cross-border trade is far greater and has been explored by international organizations, the private sector, academia and other stakeholders.**

The World Customs Organization (WCO) and the World Trade Organization (WTO) have been examining blockchain and distributed ledger technology (DLT), the internet of things (IoT), and big data, data analytics, artificial intelligence (AI) and machine learning to identify how these advanced technologies can promote trade facilitation and assist customs administrations in fulfilling their objectives of ensuring, safety, security and fair revenue collection.<sup>1</sup>

The WTO sets rules in international trade and the WCO develops the relevant standards and tools relating to border formalities. They have a long-standing partnership on account of their complementary objectives: the primary purpose of the WTO is to open trade for the benefit of all; the mission of the WCO is to enhance the effectiveness and efficiency of customs authorities; and both organizations provide capacity-building and technical assistance aimed at facilitating trade and customs procedures.

The typical areas of cooperation are in customs valuation, rules of origin and trade facilitation. More recently, the WCO and the WTO have also embarked

on numerous joint initiatives, such as ways to mitigate the effects of the COVID-19 pandemic and in the area of paperless trade and technologies.<sup>2</sup>

The *Study Report on Disruptive Technologies* (WCO, 2019) shows that a number of advanced technologies that have completely changed the way things are done (i.e. disruptive technologies) have had a significant impact on customs procedures. These technologies will continue to benefit the work of customs authorities in the future and include developments in blockchain, IoT, big data analytics, AI and machine learning, biometrics, drones, virtual and augmented reality, and 3-D printing.<sup>3</sup>

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Of these, three areas of advanced technology in particular play a significant role in the future work of customs authorities and in facilitating cross-border trade:

- blockchain and DLT
- IoT
- big data, data analytics, AI and machine learning

## **Blockchain and distributed ledger technology**

A blockchain is a time-stamped, decentralized and distributed digital record (or ledger) of transactions in which the transactions are stored securely in a permanent and near inalterable way using various cryptographic techniques.

It is a continuously growing list of records (called blocks), which are chained to each other using cryptographic tools. Unlike traditional databases, which are administered by a central entity, blockchains rely on a peer-to-peer network that no single party can control. Although blockchain is technically one type of DLT, the two terms are used interchangeably in this publication.

## **Internet of things**

IoT is the network of sensors and smart devices connected to the internet that can send and receive data and which are often found in vehicles, buildings and items embedded with electronics. IoT enables the tracking of products along the supply chain and

can reduce the costs of global trade by increasing the efficiency of shipping and transport.

## **Big data, data analytics, artificial intelligence and machine learning**

Big data analytics is the use of advanced analytic techniques on very large and diverse datasets (starting from terabytes) with different sources and degrees of complexity.<sup>4</sup>

AI refers to systems that change behaviours without being explicitly programmed, based upon data that are observed, collected and then analysed. It is a broad term that includes machine learning, deep learning, computer vision and natural language processing.

Although this publication explores these three areas separately, they are not mutually exclusive, and customs authorities often use them in combination. For example, blockchain, in combination with IoT, provides new ways to track the journey of products. It can be a powerful tool to promote transparency and traceability of supply chains.

## **Publication objectives**

This publication is a collaboration between the WCO and the WTO. The objective of which is to gain a better understanding of how the latest advanced technologies can help customs authorities to contribute to trade facilitation and to shed light on the opportunities and challenges customs authorities face when deploying the technologies.

This publication aims to raise awareness and interest among the membership of both the WCO and the WTO. It serves an important source of information and as a basis for policy actions to ensure customs authorities can contribute towards paperless trade.

The publication will be of particular interest to WCO and WTO members in the process of implementing the WTO's Trade Facilitation Agreement (TFA), which aims at facilitating the release and clearance of goods, including through the use of electronic means to exchange data and documents relating to cross-border trade transactions. The TFA plays a vital role in boosting world trade and output and in facilitating trade by simplifying, modernizing and harmonizing the following:

- movement of goods (Article 9);
- release and clearance of goods (Article 7);
- processing time through the use of risk management (Article 7);
- single-window processes (Article 10);
- exchange of customs information (Article 12);
- measures for authorized operators (also known as authorized economic operators, AEOs) (Article 7).

Implementation of the TFA has already resulted in greater customs efficiency, more effective revenue collection and better access to new export opportunities, and it has resulted in improved transparency in customs practices, fewer documentation requirements and less red tape (WTO, 2021). This publication may further assist stakeholders to take informed decisions under initiatives aimed at facilitating and securing global supply chains.

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### Customs Survey

The WCO and the WTO jointly designed 18 questions to include a chapter on disruptive technologies (see Annex), which was added to enhance the 2021 WCO Annual Consolidated Survey (ACS) and distributed to WCO members to provide a snapshot of the level of implementation by customs authorities of the three technologies mentioned above.

The questions captured the stages of adoption of customs projects using advanced technologies, and the reported benefits and challenges. The results of the ACS and the findings presented in this publication will also be used for the upcoming joint WCO–WTO publication *Study Report on Disruptive Technologies*, in 2022.

The ACS gathers information from WCO members to update a number of WCO tools, such as:

- member profiles in the *WCO Annual Report*;
- Reform and Modernization-Monitoring Activities and Projects (RAMMAP) and Single Window Interactive Map (SWIM) databases;
- *Compendium of the Authorized Economic Operators Programmes*, published annually;
- WCO Data Model.

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Out of the 183 WCO members, 124 responded to at least one, and in general to more than half, of the questions on advanced technologies. Table 1 shows the response rates according to the six regions commonly used by the WCO:

- East and Southern Africa (ESA);
- Europe;
- Far East, South and South-East Asia, Australasia and the Pacific Islands (Asia and Pacific);
- North of Africa, Near and Middle East (MENA);
- South America, North America, Central America and the Caribbean (AMS);
- West and Central Africa (WCA).

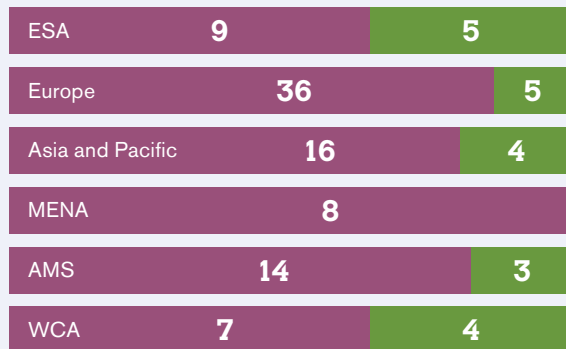
**TABLE 1**

**Response rates to at least one of the questions on advanced technologies in the 2021 ACS, by WCO region**

<b>WCO region</b>	<b>Number of members that responded</b>	<b>Response rate</b>
ESA	17	71%
Europe	41	77%
Asia and Pacific	23	70%
MENA	10	56%
AMS	20	61%
WCA	13	57%
<b>Total</b>	<b>124</b>	<b>68%</b>

FIGURE 1

### A strategy is in place to adopt IT tools and information management



Note: Total respondents numbered 105. Figures in the bottom chart indicate distribution.

The ACS results presented in this publication reflect only the responses. Where no answer was provided, the non-response was not considered in the overall figure. The information provided in the responses was enhanced with the help of follow-up enquiries and any information to be found in public sources.

Automation and advances in the use of technologies in customs authorities are usually driven by dedicated IT strategies (see Figure 1). Of the 105 members that responded, 85 (81 per cent) have such a strategy in place. In the breakdown, all respondents from the MENA region have a national strategy in place, while the share was at least 80 per cent in Europe, AMS and Asia and Pacific.

### Endnotes

- <sup>1</sup> See Ganne (2018), Patel and Ganne (2020, 2021) and WCO (2019).
- <sup>2</sup> For further information, see [www.wto.org/english/thewto\\_e/coher\\_e/wto\\_wco\\_e.htm](http://www.wto.org/english/thewto_e/coher_e/wto_wco_e.htm).
- <sup>3</sup> For further information, see <http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/facilitation/ressources/permanent-technical-committee/215-216/pc0470e1b.pdf?la=es-ES>.
- <sup>4</sup> For further information, see [www.ibm.com/analytics/hadoop/big-data-analytics](http://www.ibm.com/analytics/hadoop/big-data-analytics).