

TRADEBEAT

An International & Industry Liaison Publication

disruptive technology & customs



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Global trade is being reshaped by disruptive technologies that are redefining how goods, services, and information move across borders. Innovations such as Big Data Analytics, Blockchain, the Internet of Things (IoT), E-Commerce and Artificial Intelligence (AI) are accelerating supply chain processes, improving transparency, and transforming the operational landscape for Customs administrations. This edition of the TradeBeat examines the implications of these technologies for global trade, analyzes their impact on Customs operations, highlights modernization efforts within the Jamaica Customs Agency (JCA), and outlines key policy considerations for the future.

Big Data & Advanced Analytics

Big Data refers to datasets too large or complex for traditional processing systems to handle. With the rise of internet-enabled devices, Customs administrations now have access to vast amounts of structured and unstructured data. The phrase "Big Data" gained popularity in the early 1990s, often credited to John R. Mashey of Silicon Graphics, who used it to describe the growing challenges of managing massive datasets. Since the year 2000, the rise of the internet, social media, and mobile devices has created unprecedented volumes of data. The use of Big Data and data analytics in Customs and border management presents a tremendous opportunity in the cross-border movement of passengers, baggage, cargo and mail. As huge volumes of data are generated by people and goods moving across borders, this group of technologies provides the ability to make sense of this huge and ever-increasing amount of data.



Why Big Data Matters for Customs

- Enhances intelligence-led risk management
- Identifies anomalies in trade flows
- Improves targeting and resource allocation
- Supports evidence-based decision-making

Knowledge is power, and Big Data holds the key to vast amounts of intelligence that can be exploited. As with any benefit, Big Data comes with responsibilities. Due care must be taken by Customs administrations, as the gatekeepers, to ensure data integrity and security, as well as privacy and confidentiality are appropriately identified and managed. The data must be only accessed by the intended recipients, in a manner that has been approved.



Blockchain Technology

Blockchain is a decentralized, tamper-resistant ledger that records transactions in sequential blocks. Its transparency and inability to be modified make it ideal for international trade environments that rely heavily on trust and verification. It was first conceptualized in 1991 by researchers Stuart Haber and W. Scott Stornetta who introduced the idea of a cryptographically secured chain of blocks. Their goal was to create a system for time-stamping digital documents that could not be altered or backdated. In 1992, the concept was refined with the addition of Merkle Trees, which made the system more efficient by allowing multiple documents to be collected into a single block. Today, Blockchain key applications include finance and banking, supply chain logistics, smart contracts, digital identity and security, intellectual property, Internet of Things (IoT), among others.



Blockchain Technology cont'd

Benefits for Customs

- Real-time visibility of trade data
- Reduced document fraud
- Automated validation of export/import data
- Stronger cooperation between Customs and tax authorities

The Internet of Things (IoT)

IoT refers to physical devices equipped with sensors and internet connectivity that can collect and transmit data without human intervention. During the 2000s, the Auto-ID Centre collaborated with global companies and universities to explore a replacement for barcodes. This led to the vision of interconnected devices communicating over the internet. From the 2010s to present, the Internet of Things is widely used for both domestic and industrial purposes. Smartphones, smart home devices (like thermostats and speakers), and wearable tech brought IoT into everyday life. Industries began using IoT for predictive maintenance, logistics, and supply chain optimization.

IoT Applications in Customs

- Real-time cargo tracking
- Automated detection of tampering
- Environmental monitoring (temperature, humidity)
- Support for non-intrusive inspection



E-Commerce & The Transformation of Trade

E-commerce, or electronic commerce, refers to the buying and selling of goods and services over electronic systems, such as the internet. With the World Wide Web becoming publicly accessible in the early 1990s, companies began experimenting with online storefronts. By the mid-1990s, platforms like Amazon (1994) and eBay (1995) revolutionized online retail. During the 2000s, the expansion of secure online payment systems (like PayPal) and improved logistics infrastructure fueled rapid growth in E-Commerce. Since the 2010s, smartphones and apps enabled shopping anywhere, anytime, leading to the rise of mobile commerce (m-commerce). As of 2026, global marketplaces, social commerce, and AI-driven personalization dominate the e-commerce landscape. Cross-border e-commerce has expanded rapidly, increasing the volume of small, low-value shipments entering Customs systems.

Benefits to the Private Sector

- Access to global markets
- Increased revenue potential
- Enhanced brand visibility
- Direct engagement with consumers

While E-commerce brought many benefits to the private sector, it has also resulted in new challenges for Customs, such as:

- Rapid increase in low-value, small package volumes, which causes challenges for traditional Customs operations, for example, examination of cargo, valuation and accurate revenue collection.
- Potential abuse of “de minimis” allowances, for example splitting a shipment into many small packages to evade Customs duties.
- Increased difficulty monitoring restricted and prohibited items due to large volume of small packages.

However, Customs administrations have sought to mitigate these challenges through the sharing of information and best practices, developing and using tools such as the World Customs Organisation’s (WCO) Framework of Standards on Cross Border E-Commerce.



Artificial Intelligence

One of the technologies seen as the most “disruptive” is that of artificial intelligence (AI). AI is an area of computer science that focuses on the creation of intelligent machines that work and react more like humans. It refers to systems that change behaviours without being explicitly programmed, based on data that is observed, collected and analyzed. AI includes different technologies such as machine learning, deep learning, computer vision and natural language processing that, taken individually or in combination, add intelligence to applications.

AI is currently being used in a variety of ways around the world. It has transformed how people communicate with machines and with technology, for example, robots powered by AI run warehouses and automatically replenish stock. AI is being used in weather forecasting, livestock management and food safety. The automotive sector has invested heavily in the use of AI in semi-autonomous and autonomous vehicles. The healthcare sector is using AI in medical diagnosis and inpatient data processing. Supply chain and logistics usage is seen in supply and demand forecasting in the manufacturing and transportation sectors.

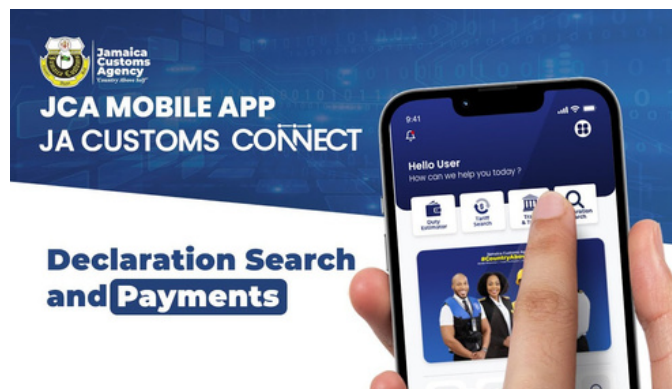
It is undeniable that AI has many benefits and is changing the landscape that Customs administrations know, however, due caution must be exercised, since it also brings with it many risks and disadvantages that must be strategically managed. The downside of AI includes:

- Inadvertent bias and possibly skewed outcomes, since the platforms it pulls from may contain developer biases
- Cybersecurity threats. AI can be used to manipulate fake voices, videos and text, including phishing emails
- Data Privacy Issues due to the possible collection and use of data obtained without users’ consent
- Environmental damage due to reliance on vast amounts of energy to do computations, as well as large amounts of water to cool the heat they generate
- Intellectual property infringement
- Potential job losses and displacement, if not responsibly deployed
- Lack of accountability. Who is responsible if something goes wrong?
- Potential for misinformation and manipulation, for example, through the generation and use of deepfakes.



The use of AI in Customs and border management presents a tremendous opportunity. Customs administrations worldwide have tapped into AI for the purposes of :

- Accurate revenue collection
- Assistance with classification of products under the WCO’s Harmonised System (HS)
- Customs audits
- Risk management and target selection
- Non-intrusive inspection
- Profiling of passengers and goods
- Logistics/ management of Customs warehouses and bonded areas
- Customer service enhancements such as chatbots, mobile apps, interactive webpages etc.
- Data protection and security





10 Questions with the CIO

The JCA is on a steady trajectory to attaining its Vision of being a “modern Customs administration”; crucial to the Agency’s success is the integrated and comprehensive use of ICT. A key figure in this equation is the JCA’s Chief Information Officer (CIO), Mr. Andre Williams, who shared his perspective on disruptive technology and its impact on the Agency.



1. What are your views on disruptive technologies and which of these have had the greatest impact on Customs operations?

A: Disruptive Technologies have resulted in a shift in Customs operations; moving from paper-based to a digital environment. It has changed the access that clients have to our services, moving from limited access to 24/7 access, with safe and secure exchange of data between Customs, Trade, other border agencies, as well as financial institutions. This allows for greater levels of efficiency for all parties concerned in the areas of trade, travel and border security.

2. How do you envision AI transforming the JCA over the next 5 years?

A: AI will play a critical role. It is an enabler, allowing the JCA to process large amounts of data in real time, and identify inconsistencies. It will play an important role particularly in risk management and the decision-making process. This applies to both cargo and passengers. It also assists in work automation, as it will cut down on repetitive tasks.

3. What specific areas of Customs are most likely to benefit from AI integration?

A: Risk management, cargo and passenger processing, border security, classification, document management and analytics (planning and research) are areas of Customs Management that will benefit from AI integration.

4. What are the biggest challenges the JCA faces in adopting AI and other disruptive technologies?

A: The biggest challenges are:

- Data readiness - ensuring all guardrails are in place
- An appropriate governance structure - to ensure proper use of the tools
- Bridging the skills gap - preparing for the new skill sets in the organization, for e.g. data engineering, data science and data analytics
- Change management - overcoming the fear of the new AI technology
- Funding and sustainability - developing the infrastructure and providing training and upskilling of staff

5. How does the JCA align its AI initiatives with Jamaica’s national AI policy recommendations?

A: There is a great need for us to ensure that there is an establishment of trust between the JCA and its stakeholders as well. As such, we have to be aligned with the national strategy. We cannot deviate from that. A strategy was developed by a few colleagues of ours [in alignment with the national AI Policy Recommendations key components and strategic direction]. Key priorities included the responsibility of AI, data governance and security, workforce readiness, capacity building, transparency and accountability, automated decision-making and innovation to improve public services and competitiveness.



6. Stakeholder engagement is a constant pursuit of the JCA, are they being engaged in regards to AI as well? What has the feedback been like?

A: We are collaborating at multiple levels with a number of industry players and partners, including proof of concepts and discussions. For example, we have been looking at the AI solutions that Microsoft and Google have been developing; and we have also met with local service providers who have been looking at various use cases, such as fraud detection.

Feedback has been received from stakeholders regarding the areas they believe are of highest concern. This has assisted with the development of our AI Agent, which will be coming on stream in the near future.

7. How is the JCA addressing concerns regarding data privacy and what governance frameworks are being considered to ensure transparency and accountability in AI-driven Customs decisions?

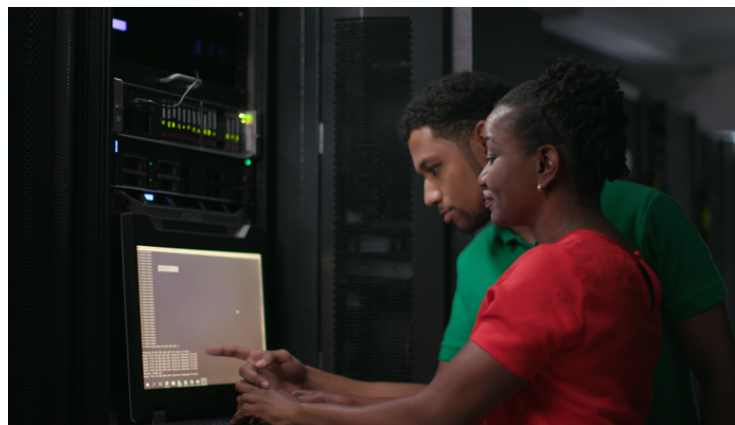
A: There are several considerations, these include privacy, security, data protection and data minimization. Privacy and security must be part of the design. We must be very cautious in ensuring that no personal data is retained and that the AI Agent only retains that portion of the conversation, which is the topic asked and the response provided. We also need to ensure that there is human interaction and confirmation at all times.

Regarding the governance frameworks, compliance with the requirements of the Office of the Information Commissioner, law enforcement agencies, the various pieces of legislation, and the need for a governance structure to ensure that it goes through the various stages of approval, is an important part of this process that must be observed.

8. What strategies are in place to reskill or upskill employees to adapt to and work effectively alongside AI systems?

A: Notably, AI is available to all employees of the Agency because it is one of the key suite of services that we use for e.g., our simplest service is our e-mail. As it relates to reskilling and upskilling, the JCA definitely intends to embark on AI literacy campaign training for staff regarding the proper use of AI. There are also other specialized areas of focus in terms of risk management, performance monitoring and governance that staff will be prepared for.

Establishing change champions is always a key part of the change management strategy, ensuring that persons who are involved can share their own experience, and then of course collaboration with academia and the private sector as well as engaging in capacity building/training with other Customs administrations.



9. Is it fair to say that these technologies are disruptive? Or are they emerging or enabling technologies?

A: They can be seen as disruptive, in that they have broken the status quo for agencies that are [technology averse]. There are instances in which there is a digital divide and digital resistance, in those instances it will be seen as disruptive. On the other hand, there are agencies that are looking to embrace technology, and that is where it will now be seen as an enabler. Therefore, it is definitely how we embrace and use the technology that will determine the level of success that we can get from it.



10. Where would you say the JCA currently stands in its adoption of disruptive technology, particularly AI, compared to other Customs administrations regionally and internationally?

A: I would honestly say that the JCA is among the most forward-thinking and adaptive, when we consider the level of digitization and the current demand for more automation in every aspect of our operations and service delivery. While a few authorities are ahead in terms of implementation and use of AI, we have done a tremendous job collaborating with key industry players to review the possibilities for the development and availability of customs-centric services. Further, the Agency, in the 2026/27 Budget, has also set aside funding for research and development, and to include the acquisition of the AI Chips with other supporting hardware to create our local instances for prototype and testing. This is definitely a strong commitment by the CEO and the management team towards greater use of technology, as an enabling technology for increased efficiency.



Disruptive Technology - Today and Beyond

Disruptive technologies are no longer abstract concepts on the horizon, they are actively reshaping the global trade ecosystem and redefining the role of Customs administrations. From Big Data and Blockchain to IoT, E-Commerce, and Artificial Intelligence, these innovations are driving efficiency, transparency, and resilience across borders. For the JCA, the transition from paper-based systems to digital platforms has already transformed service delivery, enabling 24/7 secure exchanges of information, and strengthening collaboration with our stakeholders.

The integration of AI will be pivotal in the coming years, particularly in risk management, cargo and passenger processing, and fraud detection. Yet, the journey is not without challenges. Data readiness, governance structures, workforce reskilling, and sustainable funding remain critical hurdles. The JCA's hybrid approach of building internal expertise while leveraging external partnerships, alongside its alignment with Jamaica's national AI policy, demonstrates a pragmatic and forward-thinking strategy.

Ultimately, the success of these technologies lies not only in their technical capabilities, but in how they are embraced and trusted by stakeholders. By fostering a strong data culture, prioritizing transparency, and investing in workforce readiness, the JCA positions itself among the most progressive Customs authorities regionally and globally. Disruptive technologies, once seen as threats to the status quo, are now enabling tools that can enhance competitiveness, strengthen border security, and deliver better public services. The JCA's commitment to innovation signals that Jamaica is not merely keeping pace with global trends - it is helping to shape the future of trade facilitation in the digital age.



MORE INFO



For more detailed information on some of the disruptive technologies covered in previous editions of the TradeBeat and other useful resources, click on the links provided below.

Useful links:

[Cross-Border E-Commerce](#)

[Cross-Border E-Commerce - Challenges & Solutions](#)

[Facilitating International Trade & Customs Clearance through Blockchain Technology](#)

[Big Data: Leveraging the Power of Analytics for Customs](#)

[The Internet of Things \(IoT\)](#)

[WCO/WTO, \(2022\), Study on Disruptive Technologies](#)

[WCO, \(2019\), WCO Study Report on Disruptive Technologies](#)

The International & Industry Liaison Branch (IILB) is committed to raising awareness on topics relating to International Trade, as well as issues concerning the Caribbean Community which may affect our internal and external stakeholders. Our quarterly Newsletter seeks to highlight global trade topics and their importance to Customs Administrations worldwide, specifically as it relates to the Jamaica Customs Agency.

As we realize our vision to becoming a modern customs administration delivering excellent service, we recognize the importance of knowledge transfer in delivering our objectives and use this forum as one way of contributing the vision of Jamaica Customs Agency (JCA). The IILB is located at JCA's Head Office, and our officers are available to respond to your trade-related queries. **Contact us at: iilu@jca.gov.jm.**

