



Legal Review of The Use of Technology for International Trade Supervision

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Keywords:

Technology; international trade oversight; data security; artificial intelligence; blockchain.

Abstract

International trade continues to grow rapidly in line with increasingly complex technological advances. Monitoring cross-border trade activities presents a unique challenge for each country, particularly in ensuring compliance with applicable regulations and preventing legal violations, such as smuggling and illegal trade practices. In this context, the use of technology in international trade monitoring has become an urgent necessity. Various modern technologies, such as Artificial Intelligence (AI), blockchain, the Internet of Things (IoT), and big data analytics, have been implemented to increase the effectiveness and efficiency of trade monitoring. However, the use of these technologies raises various legal issues that require further study, including data protection, cybersecurity, legal compliance, and regulatory harmonization across jurisdictions. This study aims to analyze the legal framework governing the use of technology in international trade monitoring, identify emerging legal challenges, and provide recommendations for strengthening regulations in this area. The method used in this research is the normative juridical method, which focuses on the analysis of relevant laws and regulations at both national and international levels. The approaches used include statutory and conceptual approaches by examining various legal instruments related to technology-based trade oversight. The results of this research are expected to contribute to the development of regulations that are more adaptive and responsive to technological developments in international trade oversight. Furthermore, this research can also serve as a foundation for increasing synergy among countries in technology-based trade oversight to create a more transparent, secure, and equitable trading system.

INTRODUCTION

International trade continues to experience rapid growth in line with technological advances and globalization (Susila, 2022). However, this development also presents challenges in its oversight, particularly in ensuring compliance with applicable regulations and preventing

legal violations, such as smuggling and illegal trade. In the digital era, the use of technology is a key solution for increasing the effectiveness and efficiency of international trade oversight (Deanto, 2024). Technology enables faster, more accurate, and more transparent monitoring, thereby assisting authorities in enforcing trade regulations and maintaining the stability of the global trading system (Mufrihah, 2024).

In this context, the role of technology in international trade oversight is further strengthened by various international legal instruments governing its use (Kurnianingrum, Cahyaningrum, Nola, & Novianti, 2021). Organizations such as the World Trade Organization (WTO) and the World Customs Organization (WCO) play crucial roles in establishing regulations that support technology-based oversight. The WTO, as the body that regulates global trade, promotes transparency and efficiency in trade activities, including the use of technology to facilitate oversight and compliance (Rabbani, 2021). Meanwhile, the WCO establishes operational standards in customs, including the use of digital technology in the inspection and recording of goods entering and leaving countries (Ahmadi, 2021).

In addition to the role of international organizations, international standards also play a crucial role in the application of technology for trade oversight (Kanevskia, 2022; Qureshi, 2022). Various global policies have encouraged the use of technologies such as blockchain to increase the transparency of trade transactions, as well as Artificial Intelligence (AI) to analyze trade data and detect potential irregularities (Widyastuti, 2024). Furthermore, the use of the Internet of Things (IoT) enables real-time tracking of goods, which can reduce the risk of smuggling and manipulation of trade documents (Rumahorbo, 2023). These standards aim to create a safer, fairer, and more efficient trading system.

At the national level, various countries have adopted regulations that enable the use of technology in trade oversight. Indonesia, for example, has several laws and regulations governing international trade, including the use of technology in customs supervision and data protection. The Customs Law, the Trade Law, and regulations related to information technology serve as the legal basis for the government to implement technology-based systems to monitor the flow of goods across borders. Furthermore, the use of technology in trade supervision is also regulated through various government policies related to digital transformation in the customs system and import-export licensing.

One important aspect of technology-based trade supervision is the existence of a system that supports automation in customs processes and trade document verification. In Indonesia, the implementation of the Indonesian National Single Window (INSW) is a concrete example of how technology is used to simplify the licensing process and increase transparency in international trade. This system enables the integration of data from various relevant agencies, allowing for faster and more efficient supervision. By utilizing big data analytics, authorities can identify suspicious trade patterns and take preventive action before legal violations occur (Pangestu, 2024).

In technology-based trade supervision, the role of customs authorities is crucial. In Indonesia, the Directorate General of Customs and Excise (DJBC) serves as the primary institution responsible for overseeing the flow of goods into and out of the country (Sitompul, 2022). DJBC has adopted various digital technologies, such as AI-based scanning and automated monitoring systems, to ensure that international trade complies with applicable regulations. Furthermore, the use of electronic customs clearance has streamlined the goods

verification process, reduced the potential for manual errors, and accelerated customs services (Achyani, 2025).

In addition to the role of national institutions, technology-based trade oversight also requires cooperation among countries. International trade involving multiple jurisdictions requires a system that enables secure and transparent data exchange (Setiawati, 2023). Several countries have implemented cross-border data exchange agreements, which allow customs authorities to share information in real time to prevent smuggling and trade fraud (Spiezia, 2020). Furthermore, international forums such as the Asia-Pacific Economic Cooperation (APEC) and the ASEAN Single Window have encouraged their member countries to integrate digital systems in trade oversight to improve efficiency and legal compliance (Sardjono, 2021).

With technological advancement and the increasingly complex dynamics of international trade, the use of technology in trade oversight has become an unavoidable necessity (Kristiyanti, 2025). Regulations governing the use of technology in trade oversight must be continuously strengthened, both at national and international levels, to support transparency, efficiency, and security in global trade activities. Synergy among regulations, supervisory institutions, and cooperation between countries is a key factor in creating a more modern and adaptive trading system.

Based on this background, this study aims to analyze the legal framework governing the use of technology in international trade oversight and to examine the extent to which technology can strengthen compliance, transparency, and security in cross-border trade activities. This analysis is conducted through normative legal research by examining national and international legal instruments, customs regulations, digital trade policies, and relevant institutional practices. Accordingly, this study is expected to contribute academically to the development of legal discourse on technology-based trade supervision and to provide an argumentative basis for strengthening regulatory harmonization, institutional cooperation, and digital infrastructure in international trade oversight.

METHOD

This research employs a normative juridical method, a legal research method that focuses on the study of applicable laws and regulations and legal principles. The approaches employed in this research include a statutory approach and a conceptual approach. The statutory approach is conducted by analyzing various national and international regulations governing international trade supervision and the use of technology in customs, data security, and legal compliance. Meanwhile, the conceptual approach is used to understand legal theories related to technological developments in trade supervision and their legal implications for existing regulations. Data sources in this research include primary legal materials, such as laws, international agreements, and regulations related to trade and technology; and secondary legal materials, such as books, journals, and relevant academic documents. The analysis is conducted systematically to identify legal gaps, challenges in implementing regulations, and opportunities for strengthening regulations to address technological developments in the field of international trade supervision. With this method, the research is expected to provide academic contributions in developing policy recommendations that are more adaptive to technological changes and encourage regulatory harmonization between various jurisdictions to create a more transparent and equitable international trade system.

RESULTS AND DISCUSSION

Legal Challenges in Utilizing Technology for International Trade Surveillance

The use of technology in international trade surveillance presents various legal challenges, one of which relates to data security and privacy. In technology-based surveillance systems, the trade data collected, processed, and stored includes sensitive information regarding business transactions, customs clearance, and the movement of goods across borders (Kusumaningrum, 2016). Therefore, data protection is a crucial issue in international trade regulation. In Indonesia, personal data protection is regulated by Law Number 27 of 2022 concerning Personal Data Protection (PDP Law), which stipulates the obligations of data managers to maintain security and prevent information leakage. Furthermore, internationally, regulations such as the European Union's General Data Protection Regulation (GDPR) have become the global standard for data protection, covering digital and cross-border trade (Sinaga, 2020).

One of the main risks in utilizing technology for trade surveillance is the potential for data leakage and misuse of trade information. Digitally integrated systems are vulnerable to cyberattacks, including hacking, data theft, and manipulation of trade information. Data breaches in customs systems or trade databases can have significant impacts, including unfair business competition and disruption to global supply chains (Halim, 2022). Regulations such as Law No. 11 of 2008 concerning Electronic Information and Transactions (ITE Law), which was updated by Law No. 19 of 2016 and then again by Law No. 1 of 2024, and its derivative regulations, govern electronic system security, including the obligation of electronic system operators to maintain data integrity and confidentiality.

In addition to data security issues, another major challenge is the legal gap in regulating new technologies such as Artificial Intelligence (AI), blockchain, and the Internet of Things (IoT) in the context of international trade. To date, there are no regulations specifically governing the use of these technologies in trade supervision in Indonesia. Although the ITE Law provides a legal basis for electronic transactions, it does not yet cover the implementation of AI-based technology in customs supervision or the application of blockchain in trade document tracking and verification systems. Internationally, the World Trade Organization (WTO) has encouraged its member states to develop national regulations aligned with global technology standards, but their implementation remains variable across countries.

One challenge in implementing regulations is the harmonization of laws between jurisdictions in international trade. Cross-border trade involves a variety of different regulations, including those concerning technological oversight. For example, the use of digital systems in customs in one country can conflict with the stricter data security regulations of another country. The WTO and the World Customs Organization (WCO) have issued various guidelines to ensure regulatory harmonization between countries, but to date, discrepancies remain in the application of technology policies across jurisdictions. For example, differing policies on data exchange between countries can hinder cooperation in the use of technology for trade oversight.

In addition to regulatory challenges, legal compliance issues in technology-based trade are also a significant issue. Increasingly digitalized international trade is enabling the emergence of new modes of violation that are difficult to detect by conventional oversight

systems. One common form of violation is the falsification of electronic documents used in cross-border transactions. Although Indonesia has Law Number 8 of 1997 concerning Company Documents, this regulation still focuses on physical documents and does not fully accommodate blockchain-based digital systems or smart contracts in trade.

In terms of law enforcement, monitoring technology-based trade law violations still faces various obstacles, particularly in detecting and proving violations that occur in digital systems. Technologies such as AI and big data analytics can help identify anomalies in trade transactions, but their implementation remains limited in many countries (Muhammad Wali, 2023). In Indonesia, customs supervision is supported by the Indonesian National Single Window (INSW) system, but this system still faces challenges in data integration with various relevant agencies. In some cases, a lack of coordination between regulatory agencies and legal authorities has hampered enforcement against technology-based trade violations.

Furthermore, legal preparedness to address increasingly complex violation methods also poses a challenge. With the growth of digital trade, various new forms of violations have emerged, such as price manipulation using algorithms, the misuse of smart contracts in cross-border transactions, and the exploitation of weaknesses in automated customs systems. Unfortunately, many trade regulations are still based on conventional mechanisms and have not fully accommodated the changes brought about by digitalization. At the international level, regulatory harmonization efforts, such as the WTO's Trade Facilitation Agreement (TFA), aim to increase transparency and accountability in digital trade oversight, but their implementation still requires commitment from each country (Ersya, 2016).

Given the various legal challenges, regulatory updates and adjustments are needed to ensure that the use of technology in trade oversight can be effective and remain within clear legal boundaries. While technology offers solutions to improve the efficiency of trade oversight, challenges in data security, regulatory harmonization, and legal compliance remain obstacles that need to be addressed. Therefore, synergy between national and international regulations, as well as increasing the capacity of regulatory agencies to deal with technological developments, are key factors in creating a safer and fairer trading system.

Prospects for Strengthening Regulations for the Use of Technology in International Trade Supervision

The prospect of strengthening regulations for the use of technology in international trade supervision is an urgent need to ensure that technological developments can be optimally utilized to create a more transparent, efficient, and secure trading system. One key step that can be taken is to improve national regulations to align with international standards. Countries, including Indonesia, need to adopt and align their legal policies with standards established by international organizations such as the World Trade Organization (WTO) and the World Customs Organization (WCO). This way, the rules governing the use of technology in trade supervision can be more structured and not conflict with widely recognized global trade principles.

In addition to regulatory harmonization, the use of technology must also be directed towards increasing transparency and efficiency in trade supervision. One strategy that can be implemented is strengthening policies related to the digitization of trade documents, such as e-manifests and blockchain-based digital verification systems. More comprehensive regulations

for these systems can reduce the potential for document misuse and increase accountability in international trade transactions. Furthermore, the application of big data analytics technology in supervisory policies can also help authorities monitor trade patterns more effectively and prevent various forms of potential legal violations.

To address rapid technological developments, implemented regulations must be adaptive and flexible to continuously evolving technological innovations. The government needs to design regulations that can accommodate changes in the digital trade system without hindering the development of the technology itself. For example, regulations regarding the use of artificial intelligence (AI) in customs systems must be designed in such a way as to provide legal certainty without limiting AI's potential to improve supervisory efficiency. With an adaptive regulatory approach, every technological development can be promptly accommodated without encountering legal obstacles that hinder its implementation.

Beyond regulatory aspects, efforts to strengthen the use of technology in trade supervision also require increasing the capacity of supervisory institutions. Customs authorities and related institutions must have adequate training and infrastructure to enable them to optimally operate modern technology. In this regard, regulations must also address aspects of human resource development and the use of more sophisticated technology to support supervisory duties. Investment in cybersecurity systems also needs to be strengthened to ensure that the technology used in trade supervision can operate securely and avoid the threat of hacking or data misuse.

In addition to more adaptive regulations and increased capacity of supervisory institutions, clearer policies regarding data security in trade oversight systems are also needed. Regulations governing information security standards must be developed to accommodate the data protection needs of digital customs systems. For example, policies regarding trade data encryption and user authentication systems can be tightened to ensure that data exchanged within the oversight system remains protected from unauthorized access. Stronger regulations in these areas can minimize the risk of data leaks and misuse of information in international trade.

Finally, international cooperation on data exchange and the use of technology in trade oversight needs to be strengthened through bilateral and multilateral agreements. Countries need to develop more effective mechanisms for sharing trade information to increase transparency and prevent cross-border violations. For example, Indonesia can strengthen cooperation with its trading partners in developing a digital trade data integration system that allows customs authorities to exchange information in real time. With regulations that support international cooperation, technology-based trade oversight can be more effective in preventing various forms of violations that occur on a global scale.

CONCLUSION

The use of technology in international trade oversight has become a crucial aspect in ensuring the effectiveness, transparency, and compliance with global trade regulations. The legal framework governing this aspect has evolved at both the international and national levels, with organizations such as the World Trade Organization (WTO) and the World Customs Organization (WCO) playing a crucial role in setting standards for the use of technology in customs systems and cross-border trade oversight. In Indonesia, various regulations, such as

Law Number 17 of 2006 concerning Customs and the Electronic Information and Transactions (ITE) Law, have provided the legal basis for the use of technology in trade oversight. However, various challenges remain in their implementation, including data security, regulatory gaps regarding new technologies such as artificial intelligence (AI) and blockchain, and challenges in harmonizing regulations between various trade jurisdictions. Furthermore, the limited capacity of regulatory agencies to adopt modern technology and the lack of coordination in cross-border data exchange also hinder the optimization of technology-based trade oversight systems.

To overcome these challenges, the formulation of policies that are more responsive and adaptive to technological developments in international trade oversight is needed. National regulations must be continuously updated to align with international standards, particularly in accommodating the use of new technologies that can improve the efficiency of trade oversight. Furthermore, improving coordination between regulators and trade actors is a strategic step in ensuring the successful implementation of technology in cross-border customs and surveillance systems. The government and relevant authorities need to strengthen cooperation with the private sector in implementing technologies that enable greater transparency, such as blockchain-based trade data exchange systems and big data analytics to detect suspicious trade patterns. Furthermore, investing in human resource capacity building in customs and surveillance institutions is crucial to ensuring optimal use of adopted technology. This will enable the use of technology in international trade oversight to be more effective, aligned with global developments, and create a fairer and more sustainable trading system.

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