

Blockchain Technology and Customs Procedures

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Abstract

The aim of the paper is to present the advantages of implementing blockchain technology in international commercial transactions, in general, and in carrying out customs clearance activities, in particular. If we refer to the customs clearance of goods, the use of blockchain has a number of advantages, such as: completion of customs clearance formalities in a much shorter time; customs risk management; real-time verification of goods – quantitative, qualitative, of their origin.

Nowadays, global supply chains face many challenges posed by the health crisis. The implementation of new technologies, especially blockchain technology, facilitates the tracking of events and the investigation of possible incidents, the settlement of disputes, ensuring the integrity of the cargo, the trust of the parties involved in the process, digitization.

Keywords: international trade, customs procedures, blockchain, Supply Chain

JEL Classifications: F1, O14, O00, M10

1. Introduction

Export-import transactions involve a complex mechanism and involve the participation of several parties: government institutions, logistics companies, auxiliaries in international trade, banking institutions. The blockchain technology could:

- reduce the expense and time;
- reduce the number of participants;
- reduce costs associated with obtaining documents;
- improve how producers/exporters/importers manage supply chain;
- provide real-time information on the movement and origin of goods;
- optimize and accelerate customs clearance process.

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2. Blockchain technology

Blockchain is a decentralized database, a distributed accounting register, which can record transactions between the parties in a secure and permanent way. The information is not stored on a single server, the network implies the existence of a set of computers (servers) called “nodes”, which together are connected in a *peer-to-peer* network and use the same communication system called protocol. (Díaz, 2019)

Each node has an exact copy of all the information that has been uploaded to the system and also a record of each operation performed, thus creating a decentralized network of interconnected information. (StockLogistic, 2018) The information entered in the blocks is encrypted and cannot be modified, which ensures that transactions are not duplicated and specific permissions are required to access the stored data. The information is added to the database from one block to another, one by one. (Díaz, 2019)

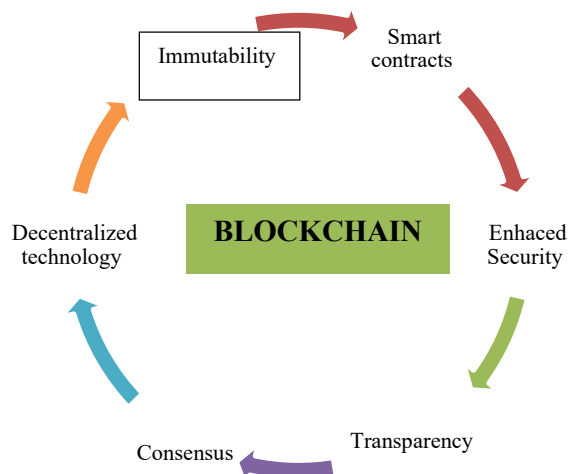


Figure 1. Blockchain characteristics

Source: adapted from Okazaki, 2018

Given its decentralized nature, the blockchain does not need any entity, a central institution to act as a trusted third party to manage the network or to verify, record and validate the transactions. Being a distributed technology, blockchain allows information entered in a node to be automatically shared with other network participants (Okazaki, 2018). The decentralized consensus is the core of

the block, it includes voting or validating the majority of network participants to ensure credibility of transactions. Each participant in the distributed network maintains a copy of the registers to prevent failure and all these copies are updated and validated simultaneously. After the chain nodes have validated the entered information, it remains in the database, on each node, being impossible to modify or delete without modifying all subsequent blocks, which implies the need for consensus of most nodes in the network. (StockLogistic, 2018)

Types of blockchain. There are several types of blockchain, so they are often classified as "public (no specific entity manages the platform), private (the platform is controlled by one entity) or managed by a consortium of companies. Another commonly used classification is without the need for permission (blockchain is open to everyone – e.g. Bitcoin) or with the need for permission (restrictions imposed on those who can read/write on blocks)". (Ganne, 2018)

In the case of the public blockchain, which generally does not require permission, the registers are available to the public, and anyone can record transactions and track the history of transactions on the registers. For example, cryptocurrencies, such as bitcoin and ether from Ethereum, have been developed on public blockchains. They require a high level of security and reliability due to the existence of anonymous users and the lack of trust between them.

In a private blockchain, users are known and registers are shared between a private group of participants; thus, access is restricted to a defined group of participants. A validator allows participants to join the system, provides permission for registries, and maintains network confidentiality. (Kouhizadeh and Sarkis, 2018)

According to Ganne, "a consortium blockchain is a type of private blockchain that operates under the leadership of a group and in which participants are identified. It is a "partially decentralized" platform. A few nodes control the consensus. These few entities can read/write the data and decide who has access to the blockchain's accounting register. Private and consortium blockchains are usually restrictive, which allows participating institutions to maintain a certain level of control and confidentiality".

3. Use of the blockchain technology in customs clearance activities

In foreign trade practice, logistics activities refer to the following activities: packing the goods, loading them in a container, truck, wagon at the factory or warehouse of departure, pre-transport of the goods (movement of the goods to the port or airport of boarding, or to the grouping platform), customs clearance formalities for export and import, main transport, insurance in international

traffic, post-transport and unloading of goods from the means of transport. (Popa, Belu, 2018).

The blockchain technology streamlines and reduces the delivery time of goods, while providing transparency and confidence to foreign trade participants. As a result of these advantages, more and more international companies are interested in adopting blockchain in their operations.

The documents specific to an international trade transaction can be stored on blockchain, and from there they can be accessed and verified online by the importer, exporter, the importer's bank, the exporter's bank, the customs regulatory authority, etc. The large number of participants involved in export and import transactions (see Figure 2), a specific feature of this type of transaction, can be reduced by using blockchain that allows the demise of third parties and other intermediaries and reducing time, cutting costs, but also risk management. (Schwarz, 2018)

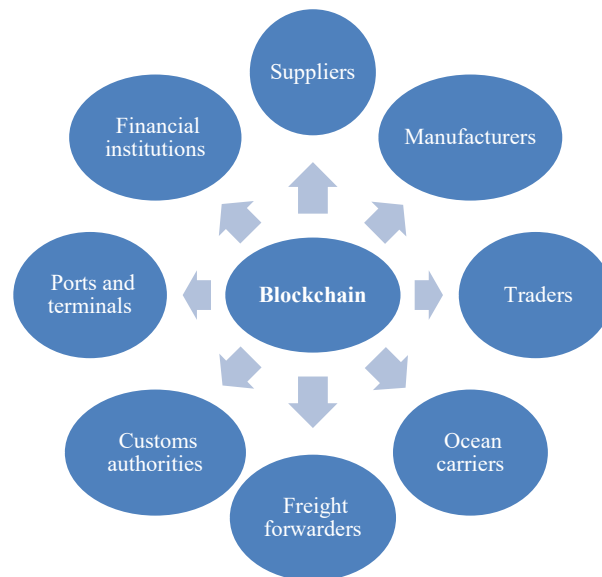


Figure 2. Blockchain participants in the case of an export-import transaction

Source: adapted from Medium, 2018

The advantages of blockchain implementation in customs clearance activities are: physical control of goods, reduction of the number of physical documents and end-to-end tracking; significantly reducing the change in the information entered

in the documents, because the information in the blockchain cannot be changed. (Dobrovnik et al., 2018)

Applications on distributed ledger technology (DLTs) in international trade can reduce huge volumes of documents and multiple bureaucratic interventions. Customs administrations can significantly improve their risk management and could help to improve trade facilitation. Blockchain applications in the supply chain management allows participants to constantly update information and therefore accurate (reliable) data needed to carry out activities from the stage of supply of raw materials to the final delivery of product to end-users. (Medium, 2018)

Currently, the costs related to customs clearance process, but also the waiting times in order to obtain customs clearance for export/import influence the ease with which these transactions are carried out. In many cases, exporter/importer have to present import or export authorizations for goods, such as licenses, but also other documents, depending on the nature of the marketed products (e.g. phytosanitary certificates, other documents necessary for health protection or human, animal or plant safety). "The final arbiter in a border transaction is customs authority, whose role is to ensure that all these documents have been obtained, that they are valid and that the goods have been lawfully declared". (Medium, 2018)

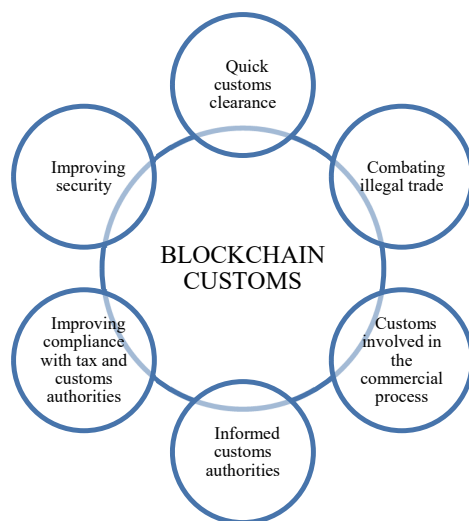


Figure 3. Customs part of a blockchain network

Source: Okazaki, 2018

3.1 The advantages of using blockchain technology in the customs activities

a. Reduction of waiting times at customs: customs clearance at import /export will be obtained much faster

Blockchain facilitates the verification of the identity of the participants involved in an export-import transaction (for example, authorized economic operators – AEO). Various organizations, such as UN/CEFACT, WTO, are studying how the technology could be implemented and integrated with existing customs systems and certification processes. (Ganne, 2018)

The customs authority will have a clearer picture of international trade transactions subject to customs clearance. This indicates the possibility to ensure that the customs authority obtains much more information on the nature, route, but also the participants involved in the conduct of commercial transactions. The result would be a successful management of the risks related to customs clearance of goods, with a direct impact on the time required to obtain customs clearance.

For example, the implementation of the “single window” (International Trade Data System – ITDS) in the USA aims to streamline the customs clearance process by providing a single platform in which all transport data and documents are entered and managed. The “single window” has been promoted by several international organizations, such as UNECE, OMV and ASEAN. However, over the last two decades, the “single window” effort has generally focused on providing traders with a single point of entry for the transmission of electronic and standardized information to the government in connection with customs transactions. (Chang et al., 2018)

b. Facilitating international trade

With the help of the blockchain technology, customs administrations and other institutions involved in carrying out export-import operations can significantly improve their capacity of risk analysis and management, thus contributing to the promotion of international trade. The blockchain technology could integrate customs authorities into a common platform linking all business entities and further enabling the exchange of information between all actors involved. (Chang et. al., 2018) Thus, the customs authorities will be able to access the information related to an export/import (seller, buyer, price, quantity, carrier, financing, insurance, etc.), will track the location and status of these goods in real time.

c. Compliance with product safety/conformity standards

Lately, concerns about the quality and safety of imported products are growing. In this regard, a series of documents are required, such as: import/export licenses, sanitary certificates, phytosanitary certificates, etc. Blockchain provides a common platform where manufacturers, logistics operators, regulators and consumers can have full access to all information on the origin of products, testing their certification and granting import/export licenses. It could also be ensured that the electronic certificate is properly issued and signed by a valid regulatory/issuing agency, while protecting the certificate against any risk of alteration or tampering with or misuse of its contents.

If the customs authorities are part of a blockchain network, customs clearance of goods can be done automatically for those goods that have been “pre-checked” by the customs register at an earlier stage, even without retaining them at the time of declaration.

d. Much easier identification of the origin of goods subject to export-import transactions

Through blockchain technology, the customs authority of the importing country can monitor the origin of the imported goods, ensuring that they are not traded counterfeit products. Thanks to the new technology, information is stored on the traded goods (from the production, verification, transport and customs clearance phase), each item is assigned a unique identification code, which leads to a considerable improvement in the transparency of the logistics process. (Medium, 2018)

For example, Walmart, in order to facilitate the tracking of food origin, entered into a partnership with IBM in 2016. In some initial pilot tests, Walmart and IBM digitally tracked both internal movements – pork from small Chinese farms to Chinese stores – as well as international ones – production from Latin America to stores in the United States. In these pilot tests, information such as farm origin, batch numbers, factory and processing data, expiry dates and shipping details were stored in the blockchain and instantly became available to all network members. In the event of a food epidemic, these data allow Walmart to track the origin of goods in a very short time (seconds) and take swift action. (Hackius, Petersen, 2017).

e. Reduction of tax evasion – VAT to be collected

A major problem for the tax authorities is to reduce the gap between the revenue provided for value added tax (VAT) and that actually collected. Thanks to increased transparency and traceability, the blockchain can help easily detect fraud and errors. The exchange of information between customs offices, exporters, importers and other related parties will take place in real time, which will allow the customs authority to identify fraudulent practices. (Chang et al., 2018)

f. Risk management

As part of a blockchain network, the customs authorities will be informed and therefore prepared to manage the risks specific to export-import operations. For example, illicit revenues are obtained by overvaluing or undervaluing traded goods or by indicating/declaring fictitious routes or transshipment points. (Chang et. al., 2018) The blockchain can help promote legitimate trade, helping to eliminate bureaucracy and streamline customs. (Okazaki, 2018)

In the future, more and more blockchain-based platforms will be developed that will also include customs authorities. A possible constraint may be the difficulty of interconnecting all customs authorities so that they can easily and quickly access the information stored on those platforms. In this context, there is a likelihood that for better access of the many stakeholders to be involved in the SCM, public blockchains will be chosen, which would diminish the trust of network members.

g. Digitization of customs documents

A particularity of the transactional mechanism of export-import operations is the essential role of the documents (see Figure 3) through which, on the one hand, the transfer of ownership over the goods is made, and on the other hand, the payment of its value (Belu, 2019)

The digitization of customs documents (mainly the customs declaration) makes it easier to manage the documents required to obtain customs clearance. Customs clearance of goods in the classical system requires, from the point of view of documents, a fairly large amount of evidence: the manifest, transport document (B/L, AWB, CMR/CIM documents), packing list, invoice, certificate of origin and so on (see figure below)

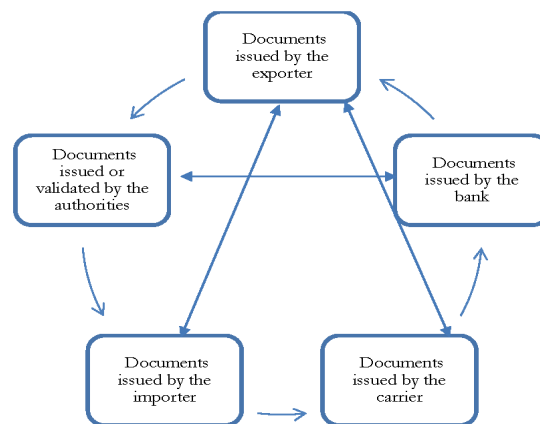


Figure 4. Export and Import Documentation

Source: I.Popa, M. Belu 2018

4. Case studies

CADENA: The Inter-American Development Bank (IDB) together with Microsoft and the customs authorities of Costa Rica, Mexico and Peru laid the foundations of a pilot project aimed at carrying out customs activities through blockchain. The pilot project is known as CADENA, and its goal is to use the blockchain technology to create a digital platform that allows real-time use of information on the status of an AEO certificate, while ensuring compliance with the highest standards of data security, traceability and confidentiality. (Delgado, 2018)

TradeLens is the platform developed after the collaboration between Maersk and IBM. The platform was used by CORE, an EU-funded security project that included the Dutch Customs Administration, the US Customs and Border Protection Service and the Science and Technology Directorate of the US Department of Homeland Security (Wass, S., 2018).

The TradeLens platform allows customs authorities and other government agencies to carry out surveillance of international trade. As soon as a container is loaded in the country of the exporting company, the customs authority in the country of the importing company can check documents such as the order and packing list in TradeLens and use them to perform an assessment of the risk associated with that delivery. (WCO, 2018)

The Korean Customs Service (KCS) and Samsung SDS have entered into an agreement with Samsung SDS to implement blockchain technology in an export customs clearance system to enable efficiency and stop customs fraud. 48 organizations and companies, including government authorities, in the field, the shipping operators, logistics companies and insurance companies, were involved in the distributed network, so that the customs clearance process is much more transparent and the information is stored in a decentralized mode (Barley, M., 2018).

Samsung SDS uses Nexledger, its blockchain platform, which allows the storage and access of export-related documents for the parties involved in the business transaction process. The platform was launched in April 2017 and acts as a cloud computing solution for companies and government authorities involved in the customs clearance process. The central platform allows real-time processing of transactions, smart contracts, as well as monitoring management developed for various industries. In May 2017, KCS and Samsung SDS started implementing a

customs clearance platform for issuing certificates of origin in a blockchain. (Bitcoin Diary, 2018)

Saudi Arabia's customs service has integrated the FASAH cross-border trading platform with TradeLens, a global blockchain-based transport solution developed by Maersk with IBM. FASAH is Saudi Arabia's national platform that interconnects all stakeholders, both public and private, involved in international trade. The purpose of TradeLens integration is to ensure immutability, traceability, reduced reconciliation, audibility and compliance (Custodio, M., 2019).

By adopting the blockchain, the Saudi customs authority said it intends to be the first in the region to offer outstanding customs services, which will make the country a global logistics hub. (Custodio, M., 2019) It is considered that TradeLens will increase productivity and transparency in the field of maritime transport and it can reduce the transit time of transports by up to 40%. (Mathew, 2019)

5. The challenges of the blockchain technology

According to a study conducted by Boston Consulting Group (2018) – based on a questionnaire with over 100 respondents from transport and logistics companies – the most cited obstacles to the adoption of the blockchain are: lack of coordination between industry stakeholders, a limited understanding of technology and lack of internal capacity.

Logistics firms typically operate in several countries and jurisdictions, with different and often complex regulatory requirements. More than a third (35%) of the respondents cited compliance issues as a major barrier to adopting the blockchain technology.

The BCG study found that only 16% of executives surveyed believe they have a clear understanding of technology and their implications for their industry. Consistent with this, only about 20% of respondents stated that the blockchain is among the top ten strategic priorities of their company. For logistics and transportation companies to trust the blockchain and change the way they work today, they need to better understand the benefits and applicability of the technology. (Schmahl, 2019)

Another result of the study revealed the limited confidence of the participants. Because the transportation and logistics industry is highly competitive, participants may be reluctant to share information.

The application of the technology is conditioned by the legislation for the recognition of electronic signatures, documents and transactions. In 2017, the United Nations Commission on International Trade Law (UNCITRAL) adopted the Model Law on Transferable Electronic Records, and various governments are working on legislation to recognize blockchain transactions, but much remains to be done. (Ganne, 2018)

The development of blockchain standards in every industry is considered a challenge because there will not be a single blockchain network, but a multitude of private or hybrid blockchains. Therefore, it is necessary to establish standards and agreements, especially in the context of interoperability between different blockchain networks. (DHL, 2018) Interoperability refers to the ability to easily distribute information and perform transactions between different blockchain systems. An interoperability challenge is to design a system that allows information to be transmitted from one chain to another. Standards are needed to give the market confidence, internationally agreed ways of working, for greater interoperability. It is important for research universities and companies to collaborate with government agencies to develop new technologies, facilitate trade and ensure compliance with trade regulations. (Chang et al., 2018)

Standardization can further advance the development of the blockchain, providing internationally agreed ways of working, stimulating greater interoperability, faster acceptance and improved innovation. Many national and international organizations are working to establish generally accepted technical norms and standards.

Transparency will be a significant force for all new systems and processes implemented, so the blockchain will increase global trade compliance. For example, block-based contracts could be created to ensure that all parties understand their obligations, which will have a significant involvement in eliminating the confusion that could arise when operating among other cultures. Blockchain can help validate payment details, ensure accurate asset representation, and automatically notify other parts of the supply chain of the finalization stage of payments (Robinson, 2019).

Conclusions

Currently, logistics involves activities that involve more and more stakeholders. The changing needs of consumers, who want transparency, quality, but also fast deliveries, have led to the emergence of many specialized logistics companies and many logistics solutions offered by them according to the needs of their customers.

An important stage in international trade is the customs clearance of goods and their placing under a certain customs procedure. The customs authority is a key player in all logistics activities, with a role in the imposition of customs duties, control of goods and consumer protection of security. Currently, the emphasis is on streamlining the activities of the customs authorities.

The blockchain application in logistics activities provides end-to-end visibility of the supply chain. The advantages of this technology include reducing the time required to obtain customs clearance, reducing transaction costs, eliminating physical documents and document transmission times between stakeholders, increasing the transparency of foreign trade operations for each member of the supply chain, while also increasing their trust.

The smart contracts simplify transactions between the parties involved, they are executed automatically when the conditions are met, thus saving time and resources. On the basis of these contracts, payments may be made without the need for an intermediary or the conclusion of insurance contracts for goods.

The customs authority, as a node of blockchain networks, has the possibility to perform a better risk analysis, having access to information on goods to cross the border.

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