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## Development of a trade model based on distributed ledger technology for the EAEU

Seryozha E. Melkonyan, Natali A. Galoyan\*, Anna N. Norkina, and Pavel Yu. Leonov

*National Research Nuclear University MEPhI, 31 Kashirskoe shosse, Moscow, 115409, Russian Federation*

### Abstract

The article reveals problems in the trade between EAEU countries, proposing the solution. Such processes as globalization and digitalization are caused by the technological advance influencing trade among EAEU countries. Some of the problems have been identified relatively recently, and some have been discovered long time ago, however, they have not found a proper solution. The existing shortcomings in the activities of the EAEU pose a significant threat to the security of the member States. The authors of the article stress the solution to the current problems faced by members of EAEU, offering the implementation of blockchain technologies. New model of trading platform, from the authors' stand point, will allow member States to solve current problems and to prevent illegal actions.

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*Keywords:* trade, blockchain, money laundering, AML/ CFT, EAEU partner States, distributed registries.

### 1. Introduction

The importance of this topic is caused by such processes as globalization and digitalization of the economy. The introduction of new technologies and rapid progress in the fintech industry is the main engine for technological development and trade. In addition, the relevance of this topic is once again confirmed by the EEC's assessment of the Union's activities carried out in 2019, the main results of which are recorded in the public report. The Commission notes that there are many unresolved problems that require the scrupulous attention of the Union's participants [1]. Some of the problems have been identified relatively recently, and some have

\* Corresponding author. Tel.: +7-915-100-83-97.

*E-mail address:* [natali.galoyan@bk.ru](mailto:natali.galoyan@bk.ru)

been discovered long time ago, however, they have not found a proper solution. The existing shortcomings in the activities of the EAEU pose a significant threat to the security of the participating States. The assessment of the functioning of the EAEU showed that some parts of customs procedures are performed in bad faith and create the possibility of committing illegal actions, such as: corruption, money laundering, misuse of funds, theft of federal budget funds, financing of terrorism and financing the proliferation of weapons of mass destruction. In connection with these aspects, the article proposes a model of a trading platform for the EAEU countries, which allows solving current problems and preventing illegal actions. At the moment, the EAEU includes: the Republic of Armenia, the Republic of Belarus, the Republic of Kazakhstan, the Kyrgyz Republic and the Russian Federation.

### **Nomenclature**

EAEU	Eurasian Economic Union
EEC	Eurasian Economic Commission
CIS	The Commonwealth of Independent States
ICC	International Chamber of Commerce
UCN	Unique contract number
CMR	Convention relative au contrat de transport international de Marchandise par Route (in french)
UNCTAD	is A Body of the UN General Assembly
WTO	World Trade Organization
AML/CFT	Anti Money Laundering and Combating the Financing of Terrorism
GDP	Gross domestic product
499-P	Russian bank position

#### *1.1. Current problems of international trade*

One of the main problems in international trade is digital inequality, particularly in the electronic commerce. It is determined by a significant gap in the development of trading platforms of member countries, which does not allow the parties to receive equal economic benefits from transactions. This problem exists both at the international level and within countries, among firms of various sizes and economic sectors. Another acute issue in international trade is the high level of corruption, which primarily affects the transparency and efficiency of transactions. More over, regulatory effective framework is not fully developed or is absent the international community [3].

According to statistics, the main groups of countries in foreign trade turnover of the Russian Federation are the countries of the European Union (share in 2019 – 41,7%), CIS (share in 2019 – 12,1%), the EAEU countries (share in 2019 – 8,6%) [2]. The Eurasian Economic Union, established in 2015, consequently brought its formation implies simplification in import and export procedures (see Fig. 1).

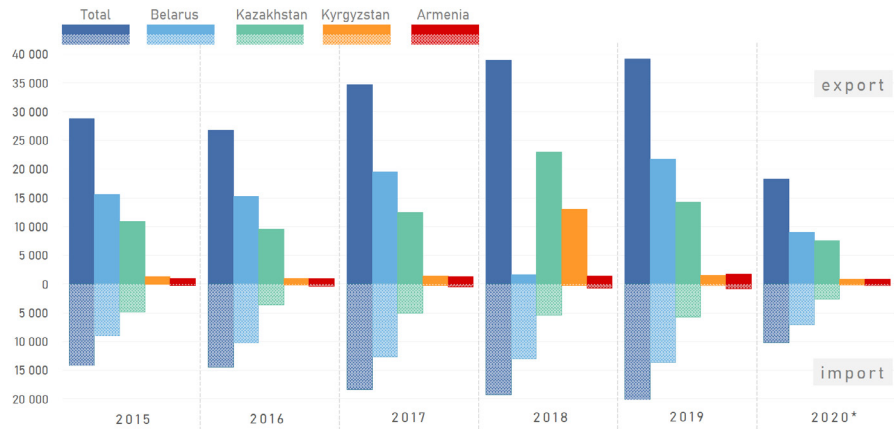


Fig. 1. Dynamics of trade turnover of the Russian Federation with the EAEU countries for the period from January 2015 to \* June 2020, (million US dollars) [3].

Difficulties in document flow arise in implementing export and import which leads to the complexity in procedures discussed above resulting in a slow-down of delivering goods. It is crucial when it comes to perishable goods, thus, the system discussed can be considered as imperfect one. Let us consider the most common scheme of customs procedures between EAEU member States (Fig.2).

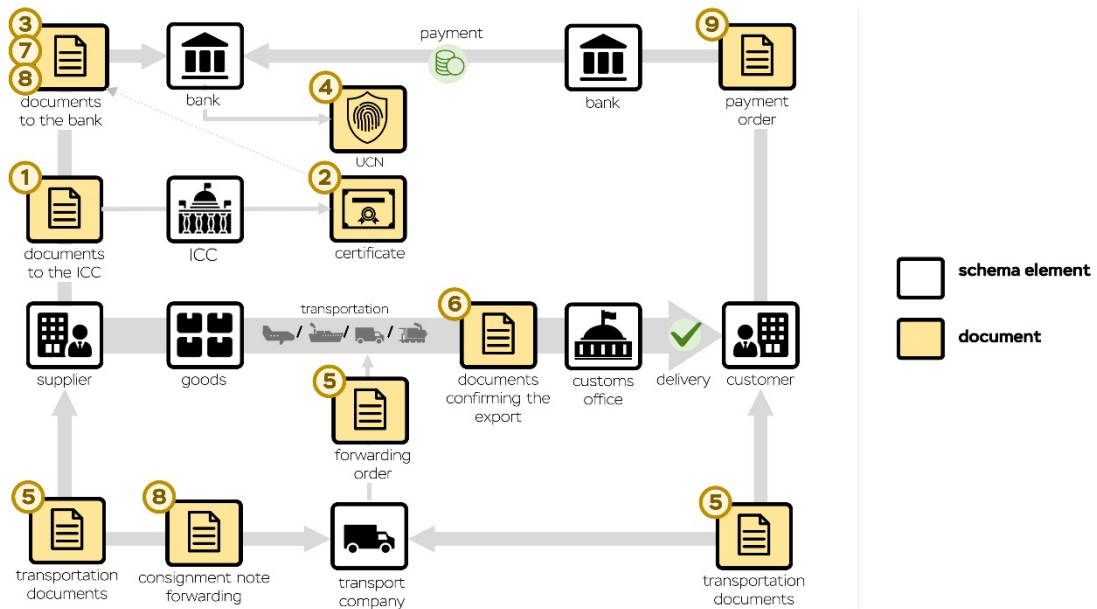


Fig. 2. Docflow diagram for the export and import of goods from the Russian Federation to the EAEU countries.

Let us consider the structure of the document flow proposed by the Russian Federation. First, it is necessary to find a counterparty who wants to purchase the goods, agrees on the terms of delivery and consents to sign a foreign trade contract. The inefficiency of the procedure is seen right from the start, as it includes a number of unnecessary procedures:

- Point 1 - Collecting the necessary documents for submission to the Chamber of Commerce in order to obtain the appropriate certificate. Documents to submit: a. Incoming and outgoing invoices; b. Quality certificate; c. Certificate of production nomenclature; d. Application for a certificate;
- Point 2 - When exporting goods produced on the territory of the Russian Federation and exported to the EAEU country, documentary proof of the origin of the goods is required. Such a document is the ST-1 certificate, and depending on the country of production and export of the goods, the form of the certificate will change;
- Point 3 - If the contract amount is from 6 million rubles. for export (from 3 million rubles for import), the contract must be registered with the bank with which the monetary transactions will be carried out;
- Point 4 - As a result of the registration order, the bank assigns a unique number to the contract (UCN);
- Point 5 - Depending on the terms of the foreign economic contract, it may be necessary to involve a transport company that will transport the cargo. A contract is signed with the transport company. The transport company, in turn, provides the carrier, to whom it transmits the forwarding order, and a vehicle for transporting the goods. Depending on the type of transport, the type of document also varies: a. air waybill (for air transportation); b. railway bill of lading (for rail transport); c. bill of lading – (for sea transport); d. CMR – (for road transport); e. about the shipper and the consignee; f. about the cargo; g. about the carrier company and about transport;
- Point 6 - At the customs point, you must provide all documents that have arisen in the implementation of customs procedures, among them: a. The foreign trade contract b. Transport document c. Invoice seller d. Packing list/ Technical passport, e. UCN (unique contract number), f. Permits, g. Phytosanitary certificate;
- Point 7 - If the receiving party has an obligation to pay for the delivery services, after the payment, supplier is obliged to provide information about the currency transaction to its bank branch;
- Point 8 - After the shipment of the goods, basing on the bill of lading, the exporter provides to the bank a certificate confirming the documents;
- Point 9 - After payment, the buyer submits a payment order to its bank branch.
- We have looked at the basic model of the document flow, showing the average exporting or importing procedure. Clearly it is seen that even a simplified model is inflexible, as the list of documents may vary depending on the goods and the terms which, in turn, make the model more complex. It reduces the efficiency of export/import sales, which result in a decline in a rate of international trade.

### *1.2. International practice of solving cross-border trade problems*

According to the report published on the site UNCTAD, digitalization will speed up international trade, as well as ensure the competitiveness of Russian goods on the international market, and at the same time, improve the standard of living of the population [4]. Therefore, UNCTAD is actively working on the "E-Commerce for All" project, which provides member States with technical and empirical support to insure effective implementation of e-trade. From their prospective, blockchain technology will serve as an effective tool for improving the processes of international trade. First of all, the technology will simplify the formal registration of transactions, certification and reduce the duration of the performance of obligations of the parties and the trade costs of cross-border trade. According to preliminary estimates of WTO experts, the use of digital technologies in trade will allow developing countries to increase their share in world exports to 57% by 2030, as well as to increase the share of services in world trade to 25%. The use of digital technologies will reduce the costs of cross-border transactions [6].

The Decree of the President of the Russian Federation of 09.05.2017 No. 203 "On the Strategy for the development of the Information Society in the Russian Federation for 2017-2030" notes the significant role of the development and digitalization of the economy, and its importance in ensuring the competitiveness of the Russian Federation at the international level [7].

The introduction of innovative technologies in the activities of firms resulted in a reduction in transaction, as well as transport and logistics costs. The length and formality of current customs procedures increase trade costs and reduce the speed and efficiency of export and import processes [5].

Soon after its introduction, the technology of distributed registries (blockchain) found a fairly wide application in the economy [8]. There are different interpretations of the concept of "blockchain technologies", but most often they are defined as a distributed and decentralized database that has certain properties: immutability of the data; reliability; cross-border nature; optimality; digitalization; simplicity; decentralization.

Considering all aspects discussed above we suppose, new technologies will significantly reduce the time of export-import procedures, among which, high risks of conducting fictitious transactions [4].

### 1.3. International practice of implementing blockchain technologies in trade

A significant advantage of blockchain technology is the ability to digitalize any transactions and ensure their reliability and security. For banks, this technology is a way to reduce transaction costs. At the same time, distributed registers will allow to more accurately track the status of goods during their transportation, as well as the procedure for transferring ownership rights during their delivery. In addition, it significantly simplifies the procedure for product certification, due to the fact that this technology will contain the most complete information about the product, its characteristics, useful properties, manufacturer, etc., which will avoid the turnover of surrogate goods on the market in order to protect the interests of consumers.

For example, in January 2018, the cargo company Maersk and the American technology company IBM announced the set up of a joint venture aimed at finding and creating more efficient methods of conducting international trade using blockchain technology. The implementation of the idea, according to the forecasts of the companies, will reduce the cost of documentation by up to 20% of the total cost of the entire transportation process. At the same time, according to IBM experts, digitization of data will reduce not only operational, but also administrative costs. More than this, IBM together with the Swiss holding company UBS Group AG began working on the introduction of blockchain technology for trade finance.

The technology of distributed registries is also becoming more widely used in Russia. According to Russian experts, the potential effect of the introduction of blockchain technology by 2024 will increase income in 1.5 trillion rubles. Today, blockchain technology has three main areas of implementation: smart contracts, cryptocurrencies, and digital platforms (in other words, digital ecosystems). As noted earlier, smart contracts, which are a special case of using blockchain technology, can be considered as an effective tool to simplify the workflow process. A number of problems related to the document flow in international trade can be solved with the help of smart contracts (English Smart contract - smart contract), which operate on the blockchain platform [2]. The so-called "smart contracts" have a number of advantages that will allow to optimize trading transactions (Table 1). Let us consider the model of a smart contract functioning with an example of money transfer operation (Fig. 3).



Fig. 3. Model of the functioning of a smart contract on the example of a purchase and sale transaction.

Due to the transition to the digital format of document processing, the risk of making mistakes, which often occur when manually filling out paper documentation, is significantly reduced. Due to the high speed of business processes, the transaction time is also significantly reduced.

Table 1. Advantages and disadvantages of using smart contracts on blockchain.

Advantages	Disadvantages
Automation – the obligations of the parties are automatically carried out by the algorithm	Implicit errors in the smart contract algorithm, identified later, can no longer be corrected
Autonomy-the autonomy of the transaction process allows the parties to independently determine the terms of the contract, as a result of	The absence of clear rules in the Russian legislation regulating the conduct of such transactions

which there is no need to resort to legal procedures which leads to lower costs.

Confidentiality - transaction data is transferred to the chain of distributed registries while maintaining the personal data of the parties confidential

Transparency - all participants in the chain have access to information, and the entered data is not subjected to retrospective adjustment, which eliminates the possibility of any kind of fraud

When using blockchain, taxation issues arise at the state level, requiring a review of the current tax system and the development of a new system

The advantages discussed above introduce the main advantage of the blockchain technology, which is effectiveness in preventing money laundering. Due to the technical features of the functioning of this decentralized system, it is highly likely to prevent cyberattacks. When it enters the distributed registry, the data is hashed (transformed and mixed) and encrypted (Fig. 4). That is, the hash function calculated from the previous block is added to the header of the chain block. The hash consists of letters and numbers that are unique for each object that falls into the blockchain, and the hash length for all is unchanged. Such data processing allows you to ensure the security of storing information on the server, and the immutability of the history of operations and the decentralized storage of data distributes control between different users prevent the possibility of a cyberattack [9].



Fig. 4. The main stages of the smart contract operation.

To solve modern problems that arise when using a distributed registry, various consensus protocols are used. In this context, the Proof of Process (PoP) deserves special attention. The problem of ensuring the secure storage and exchange of data raises the question of data integrity. Data integrity is proof that the data entered in the registry has not been changed. One of the most relevant proof tools is the "digest" (digest), which works like a digital fingerprint (you can match it with an electronic signature). When performing a sequence of steps, they are gradually confirmed (certified, signed) by digests, as a result of which, there is a need to prove the origin. This is the ability to prove that the information was certified in chronological order (taking into account the time of the steps), which also allows you to prove the reliability of the information.

The algorithm of the PoP consensus protocol can be described using the example of the game "sea battle". The game consists of three stages [10]:

- Players place their ships on a grid (10 by 10 cells). At this stage, Player 1 and player 2 place the ships on the grid field wherever they want.
- Players guess the locations of the enemy ships by announcing the position of the cell to each other. At the same time, they mark the declared cell and tell each other the outcome of the event: miss (white pin), the ship is hit, the ship is sunk (red pin). For example, player 1 makes a move, declares a cell in which he places a pin corresponding to the outcome of the step. Such a move can be considered an attack. Player 2 then announces the outcome of the move and responds with a defense. The player making the move is responsible for the current move. Thus, each step includes the following parameters: a. what is guessed (the coordinates of the other player's ships), b. who guesses, c. when guesses, d. position in the game (attack or defense).

- The player who can first guess the positions of all the enemy ships becomes the winner. It is obvious from the game's algorithm that players must trust each other at each stage. And the player making the move must be able to prove his move. Let us mean that one of the players won the game, but in order to re-use their account to gain reputation, they must prove that they won. This can be done in no other way than by publishing a record of the entire game. This problem can be solved by fixing the trust of an objective witness in a signed data receipt confirming the player's victory. Thus, the game requires a system of trust on which to base the entire process, where each player will be able to establish the details of their movement as an objective fact. As one of the ways, you can consider notarizing each step of the player and the final outcome of the game (victory). The notarized records can then be used as a trust token.

The trust between players, you can imagine unrelated or modular way and to consider, in three variations:

- players fully trust each other (any player may open the package to check the outcome of the game);
- players may not fully trust each other (players are not required to disclose their secret steps);
- players do not want to trust each other (minimum confidence).

This method is possible by creating a so-called Process Proof system (PoP). However, the risks of violating the bilateral agreement still exist. This can undermine credibility of the e-commerce platform. To minimize the risk one can employ Proof of Trust, which was created by IBM. This method is used in order to optimize commercial purposes, providing tight security for the users and promoting commerce and economic growth. The pandemic has laid bare the acuteness of the method, together with Block Chain and Smart contracts technologies [10].

#### *1.4. Suggestions for further docflow improvement in the customs procedures*

The technology of distributed registries and the algorithm of smart contracts can serve as an optimal solution. The implementation of all export and import processes in the digital platform will ensure transparency of all operations, speed up the process of documents approval and registration, as well as regulate the timely obligations fulfillment within the terms of transactions. According to the proposed hypothesis, it is possible to present a unified scheme of processes when using distributed registry technology (Fig. 5). It is worth noting that one of the important participants in the chain is a bank. It is responsible for identifying customers, opening an account, and providing access to an electronic platform where counterparties can find users with overlapping interests (A1, A2, A3). As a result of the interaction, users determine the terms of transaction agreement, writing the terms in the form of a code and issuing a smart contract (A4, A5). The product or service is provided to the customer, and the latter, in turn, has to confirm it (A6) in the platform. After receiving information about the goods delivery or the provision of services, the bank makes a transfer of funds to the customer's account and, if the obligations of the parties are fully fulfilled, the smart contract is considered to be implemented (A7).

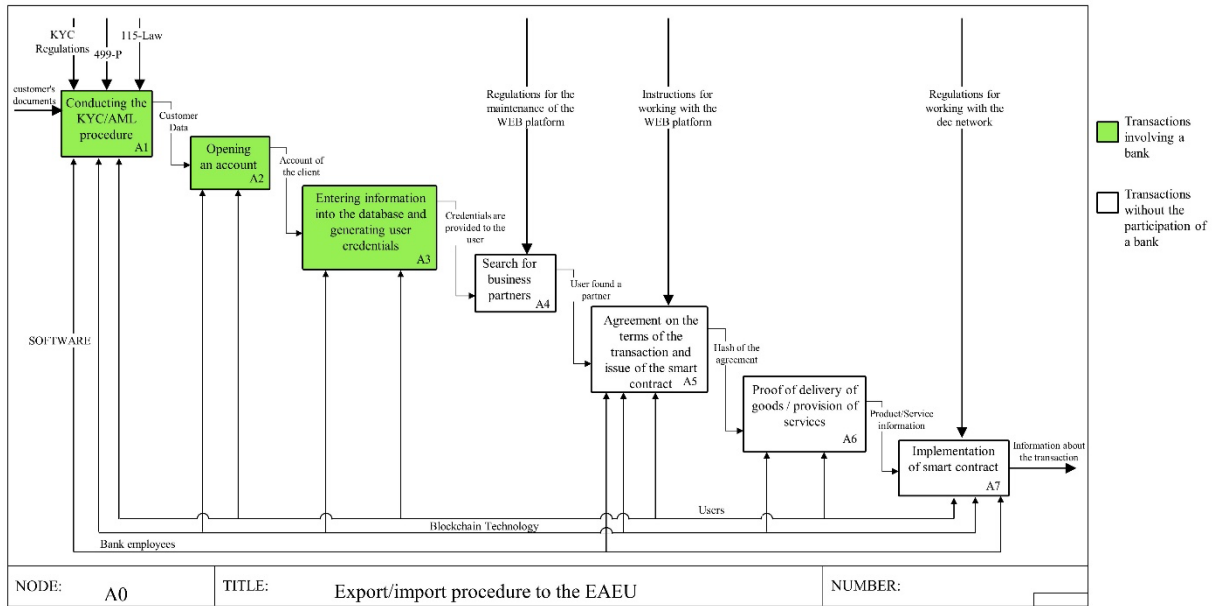


Fig. 5. The procedure of execution of customs procedures with the help of distributed registries in IDEF0 notation.

However, it is worth to note that this system is also not perfect and it may reveal problems. For instance, let us assume that the customer has received a product or service, but has forgotten to indicate the fact of receipt, or has done it intentionally. Here, one should consider the question about supplier's rights protection together with the problem of resolving such disputes. It is possible only under state regulation, i.e. it is necessary to develop a high-quality regulatory framework. For example, in China, a group of specialists was formed to resolve Internet disputes, which quite effectively copes with the problems that arise. Another way to solve the issues is to choose the optimal protocol-consensus, one of the variations of Proof of Trust which was mentioned above. We suppose, that it will resolve disputes effectively in various areas of jurisdiction. This consensus assumes the possibility of restoring the trust of users by resolving disputes that arise during transactions, but to get the final result, one needs to go through several stages [11]:

- identification of the claim;
- comparison of the statements of the parties to the transaction (evidence of comparison) – at this stage, the parties to the transaction have the opportunity to provide their evidence in support of their version;
- election of a judge-the consensus algorithm selects several of the most suitable specialists to resolve a dispute, depending on its nature;
- independent voting-selected delegates verify the evidence of the parties independently in a secure environment;
- summing up-the result is determined by a majority vote, which guarantees its fairness;
- immutability of data – the data in the registry does not change and is available for careful analysis;
- dispute resolution – the decision obtained by specialists is provided to the parties, which is the resolution of the case;
- restoring trust-the transparent nature of dispute resolution allows you to restore trust in transactions.

The consensus protocol occurs when the obligations of both parties to the transaction have already been fulfilled. Taking into account the fact that the proposed platform is closed and will exist exclusively within the framework of the EAEU, an accidental or intentional violator of the process may be blocked by the regulator (bank). Thanks to the blockchain technology, the entire process will be completely transparent for all participants in the transaction, which will allow banks to more effectively regulate operations in terms of countering money laundering and terrorist

financing (ML/FT) in accordance with the Federal Act 115-FL (of August 7, 2001) [12]. At the same time, banks will be able to provide more productive assistance to the financial intelligence unit in conducting financial monitoring, identifying suspicious transactions and preventing ML/FT. As a consequence, the proposed platform will not only have a positive economic effect (reducing costs and increasing the efficiency of customs procedures), but will also have a noteworthy social significance (solving the pressing global AML/CFT issue) within the framework of the EAEU [13].

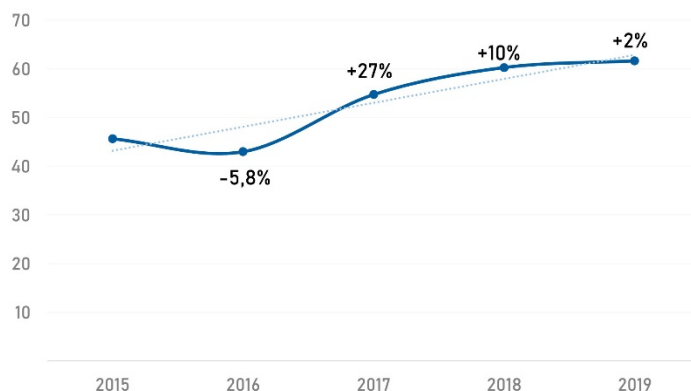


Fig. 6. Dynamics of the total mutual trade turnover of the EAEU countries for 2015-2019, trillion rubles.

According to statistical data presented on the website of the EEC (Eurasian Economic Commission), the increase in the dynamics of the total mutual trade turnover between the EAEU countries from 2015 to 2019 amounted to more than 33% (from 45 615 678 752 rubles to 61 633 961 841 rubles, respectively). The growing trend positively characterizes the development of the economic interests of the allied countries, therefore, it is a sign of further more effective cooperation. This, in turn, will increase trade turnover and the level of its overall dynamics, as an electronic platform, based on blockchain technology, will maximize the growth of dynamics [5].

According to the report of the EEC, presented in 2019, the state of the economy in the regions of the allies is quite stable: the EAEU countries are developing in the environment of moderate economy. Nevertheless, the EEC notes the existing trade shortcomings are still acute. Table 2 shows the main aspects that will be improved by the introduction of new technologies [1].

Table 2. Advantages and disadvantages of using smart contracts on blockchain.

Current imperfections identified (2019)	The effect of the introduction of new technologies
The level of GDP in the Union as a whole declined (relative to 2018) and lagged behind the world indicators [1].	One of the global effects of the development of a single platform for trade is an increase in the level of GDP. This will be due to a reduction in costs of current customs procedures. In addition, the platform will speed up customs procedures and control timely payment for received goods and services.
Large-scale work has been carried out to simplify the formal part of customs procedures. Simplification of procedures includes issuing of a single documentation. A single technical regulation has been created: 48 technical regulations cover 85% of mutually supplied products [1].	Despite the taken measures, mentioned above, it is obvious that even simplified procedures require a large package of documents. A single electronic platform will allow one to simplify the document flow during export and import as much as possible.

Unified procedures for evaluating products in compliance with the requirements, but an effective mechanism for protecting consumers and the market from "dangerous" suppliers and low-quality products has not yet fully worked out [1].

To date, the EAEU has issued about 500 thousand certificates of conformity and more than 5 million declarations of conformity [1].

However, the EEC notes that the evaluation of products, the issuance of certificates and declarations are not an effective tool for resolving such problems as: low-quality products and unscrupulous suppliers. In addition, they create difficulties in regulating activities like certification and declaration, which pose a threat to AML / CFT [1].

Moreover, the Commission and the supervisory authorities of the NPP States found that the assessment of imported foreign products is not carried out properly, but it is performed either partially or completely without evaluation procedures. This leads to the unjustified issuance of permits, which makes us think about the presence of a corruption component in this area [1].

Recording up-to-date product information in an electronic platform that is accessible to all platform participants will allow for a more efficient evaluation procedure and ensure the transparency of the evaluation procedure. Certain sanctions may be imposed on unscrupulous suppliers, for example, in the form of temporary or permanent blocking of access to the account. At the same time, the so-called "black" list of unscrupulous legal entities should be made publicly available.

The repeatedly mentioned transparency of the platform will become an effective tool for eliminating the corruption component, money laundering and terrorist financing. At the same time, the transparency of the platform will contribute to the regulator's activities (the bank, as a third party) in controlling the ongoing monetary transactions and in improving the effectiveness of AML/CFT procedures.

In conclusion it should be repeatedly mentioned that current problems in trade system between EAEU countries are pose a serious threat to economy of partner States. Nevertheless, these problems could be settled within integration in the customs procedures the blockchain technologies. The undertaken analysis shows that this technology will provide an opportunity to minimize procedures outlay and maximize profit from transactions. Therefore, States will the country will benefit more from exports, which will contribute to the rapid development of the economy and improve the standard of living of the population. Moreover, it should be remembered that the blockchain technologies is a multi-faceted platform where one can mine coins, so in the sequel it could be considered the issue of conducting transactions using cryptocurrency.

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