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# THE SEED SYSTEM IN CUSTOMS RISK MANAGEMENT: EXPERIENCE OF THE WESTERN BALKANS AND PROSPECTS FOR UKRAINE

***Purpose.*** *This article aims to analyze the experience of implementing and operating the SEED system in the Western Balkan countries as a tool for customs risk management, to assess its impact on the efficiency of customs control, regional cooperation, and international trade, and to explore the possibilities and prospects of applying a similar system in Ukraine.*

***Methods.*** *This article uses comparative analysis to examine the experience of the Western Balkan countries in implementing the SEED system, particularly its impact on customs control efficiency and regional integration. A case study method is used to analyze examples from Serbia, Kosovo, and other countries, highlighting the technical, political, and organizational dimensions of SEED's operation. Expert assessment methods and data from international organizations (EU, CEFTA) are employed to evaluate SEED's effectiveness in combating smuggling and simplifying customs procedures. The historical method is also used to trace the system's evolution from initial pilot projects to the current SEED+ version.*

***Results.*** *The article explores the implementation of SEED in the Western Balkans as a tool for customs risk management. It analyzes the platform's role in enhancing the efficiency of customs operations, facilitating foreign trade, and promoting regional integration. Special attention is given to the role of electronic data exchange in fostering international trade and ensuring border security. Case examples from Serbia, Kosovo, and other countries demonstrate how SEED contributes to process automation, reduced border delays, and improved intergovernmental cooperation. The stages of SEED development, starting from pilot testing and continuing to expand into SEED+, as well as the prospects for its integration with EU customs platforms, are considered. The paper also discusses the technological, institutional, and political challenges faced during implementation. The potential for adapting SEED in Ukraine is assessed in the context of the country's EU integration goals.*

***Conclusions.*** *The experience of the Western Balkans shows that the SEED system is an effective instrument for customs risk management and cross-border data exchange. It supports faster customs clearance, reduces violations, and builds trust between customs authorities. SEED plays a vital role in regional customs cooperation, trade facilitation, and securing cross-border trade in crisis conditions. The findings underline the relevance of studying and adapting this experience for Ukraine's customs reform agenda.*

**Key words:** electronic data exchange, customs control, foreign trade, European Union (EU), customs digitalization, customs simplification, regional integration, smuggling.

**JEL Classification:** F13, F15, H26, H83, L86.

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**Introduction.** In the process of integrating into the customs space of the European Union (EU), the customs authorities of Ukraine are developing a modern risk management system. One of the essential prerequisites for building such a system is the electronic exchange of data between the customs administrations of countries that are foreign trade partners. International customs cooperation in this area is a key element in detecting and preventing potential violations of customs legislation, enabling timely responses to risks and minimizing losses to the state budget. This interaction contributes to greater transparency in foreign economic activity by allowing prompt comparison of information on goods, entities, and transportation routes. As a result, it creates the conditions necessary for the use of analytical tools to forecast risks and enhance the security of international supply chains.

Taking this into account, as early as 2023, the State Customs Service of Ukraine and the Romanian Customs Authority signed a Memorandum of Understanding regarding the procedures and testing of electronic information exchange. The Memorandum of Understanding outlines that both parties will exchange

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information in a secure environment using a standardized approach and will test the effectiveness of automated electronic data exchange through the Systematic Electronic Exchange of Data (SEED) system (EU4Digital, 2023).

To date, two phases of the pilot project for the exchange of preliminary customs information between Ukraine, Moldova, and Romania have been successfully completed within the framework of the EU4Digital program using the scalable SEED+ platform. Based on the experience gained, the Ukrainian customs authority is preparing to implement a similar project with Lithuania and is conducting relevant consultations with Finland. The issue of information exchange was also raised during the visit to Ukraine by the heads of the customs administrations of the Nordic countries – Denmark, Iceland, Norway, Finland, and Sweden. Therefore, there is every reason to expect the potential expansion of this cooperation format to the Northern European region (Zviahintsev, 2025).

The SEED (SEED+) platform is a specialized EU information system designed for the rapid exchange of data between customs and tax authorities concerning the movement of goods, as well as to verify the status of economic operators and delivery locations. This platform provides customs administrations with instant access to up-to-date registers of authorized economic operators and warehouses, thereby minimizing the risk of fraud and document falsification. The integration of SEED with analytical risk management modules enables the automatic screening of suspicious transactions and routes, expediting decision-making related to customs controls. The use of SEED as part of a global digital customs ecosystem enhances the transparency of supply chains, promotes the harmonization of procedures, and establishes a unified foundation for customs risk assessment.

The need to develop the SEED system arose from the inefficiency of manual customs data processing, the increasing volume of trade, the need to combat smuggling, corruption, and other cross-border offenses, as well as the requirement to harmonize customs procedures in preparation for integration with the EU. The development of SEED originates from the European Commission's Customs and Fiscal Assistance Office (CAFAO) Program, launched in 2002. This initiative was aimed at supporting the customs and tax administrations of the Western Balkans in their preparations for future EU integration (CAS, 2024).

It is well known that the Western Balkans, for which the EU developed the SEED platform, include six countries: Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, Serbia, and Kosovo. Kosovo is not recognized by many countries around the world, including Ukraine. The positive experience of these countries should serve as the foundation for implementing the SEED+ platform at the national level in Ukraine.

**Purpose.** This article aims to analyze the experience of implementing and operating the SEED system in the Western Balkan countries as a tool for customs risk management, to assess its impact on the efficiency of customs control, regional cooperation, and international trade, and to explore the possibilities and prospects of applying a similar system in Ukraine.

**Methods.** This article applies comparative analysis to examine the experience of the Western Balkan countries in implementing

the SEED system, particularly its impact on customs control efficiency and regional integration. A case study method is used to analyze examples from Serbia, Kosovo, and other countries, highlighting the technical, political, and organizational dimensions of SEED's operation. Expert assessment methods and data from international organizations (EU, CEFTA) are employed to evaluate SEED's effectiveness in combating smuggling and simplifying customs procedures. The historical method is also used to trace the system's evolution from initial pilot projects to the current SEED+ version.

**Results.** Ongoing crises and challenges in the socio-economic and political spheres create the need for a clear system of response and for reducing their impact on society and the state. In such conditions, the ability of a state to ensure its own security, including military, political, and food security, becomes a top priority. The combination of the COVID-19 pandemic and the russian-Ukrainian war has caused the most significant food crisis since World War II. This has led to increased food insecurity, with approximately 1.7 billion people currently facing vulnerability in access to food, and this number may continue to grow (Lin et al., 2023).

The countries of the Western Balkans depend on exports of grain, vegetable oils, and fertilizers from russia and Ukraine. As a result, they are indirectly affected by disruptions in global trade, which raises urgent concerns about food self-sufficiency and the need to establish alternative supply routes (World Bank, 2022). At the same time, the Western Balkans are a key trading partner of the EU in both exports and imports. From 2017 to 2021, between 81 and 83.1 percent of exports from the Western Balkans were directed to the EU, while imports from the EU accounted for between 50.9 and 63.9 percent of the region's total imports (OECD, 2022).

Global crises in the agricultural market, combined with local problems such as outdated technologies and limited public support for the implementation of modern digital systems, are further exacerbated by weaknesses in the region's transportation infrastructure. Inefficiencies and the failure to meet the demands of competitive cross-border trade present significant obstacles to progress and the achievement of food security. Long waiting times and border queues, which can stretch up to 15 kilometers, have a serious impact on cargo flow and regional competitiveness, as emphasized by stakeholders in the business community (Vulović, 2023).

In response to the state of uncertainty and the growing security threats facing the Balkan countries, the SEED system has undergone further development, modification, and scaling. Within the framework of this program, various data exchange systems were tested, with the most successful of them serving as precursors to the SEED system. For example, the Danube River Early Warning System (DREWS) facilitated the exchange of data on vessels and cargo among Hungary, Croatia, and Serbia, demonstrating the viability of electronic data exchange during customs operations. Another notably bold initiative at the time was the use of the South-East Messaging System (SEMS), a tool designed for the electronic exchange of intelligence information.

During the testing phase, the most conceptual challenges were identified and described in the context of ambitious plans to build a unified information data exchange system. Allow us to analyze some of these challenges.

1. Difficulties in integrating numerous entities, including enterprises of various ownership forms and public authorities, which have different approaches to the formation, storage, and distribution of information flows. In other words, standards for open information and even the understanding of this concept vary significantly, even within a single country. The spectrum ranged from fully digitizing all documentation to maintaining paper-based records with periodic scanning of documents, putting the entire project at risk. The solution was to allow simplifications only for those companies that meet data exchange standards and have the resources to maintain this state.

2. Emergence of problems that the system's creators had not anticipated due to lack of experience, varying motivations among program participants, inertia in accepting reforms, and the absence of a clear answer to the question of why the system was needed. The flexibility of technical solutions must be based on clear understanding of the ultimate goal and the necessity to unite for survival in difficult and competitive conditions.

3. Lack of experience among implementers and limited capabilities of developers to provide training for personnel. For a considerable period, several systems operated simultaneously: an internal one for enterprise operations, tax payment, and profit distribution, and an external system focused only on the minimum requirements necessary for implementation.

4. Imperfections and high costs of preparatory work during the early stages of creating electronic databases and establishing electronic commerce. Standard electronic data exchange solutions required manual execution of many preparatory steps, which could cause errors. This negatively affected not only the accuracy of information but also the speed of processes such as order placement, packaging, shipping, invoicing, and other functions.

All of these factors led to increased costs and complexity in conducting foreign economic activities for both public authorities and commercial organizations. Development has been driven both by government incentives and cooperation with international donor organizations, as well as by the confidence of a small group of commercial leaders who believe that gaining competitive advantages will enable increased profits.

At the end of 2007, as the CAFAO program was approaching its conclusion, the European Commission decided to fund a pilot project to implement systematic electronic exchange of customs data among the customs authorities of the Western Balkans. The culmination of these efforts was the creation of SEED, which has since played a significant role in strengthening administrative capacity in IT and risk analysis, increasing revenues, and preventing or combating illicit trade, while simultaneously improving regional cooperation. These successful technical and hardware solutions were based on regular modernization and maintenance. During this period, three consecutive projects were implemented. The implementation of the SEED system which included the development of bilateral protocols and operational instructions to ensure that each customs administration was equipped with the necessary legal framework for effective data exchange. In recent years, the expansion of SEED+ has been piloted in Eastern Partnership countries, further broadening the system's scope and applicability beyond the Western Balkans.

During the COVID-19 pandemic crisis, the SEED system was used to exchange pre-arrival information, which included data on goods transported by trucks along designated corridors carrying essential items. This information was shared among customs administrations and the phytosanitary, veterinary, and sanitary authorities involved in processing goods. The list of goods considered essential was agreed upon by the Parties to the Central European Free Trade Agreement (CEFTA) at the HS8 level of the Harmonized Commodity Description and Coding System of the World Customs Organization.

The idea that SEED could be developed to enable systematic exchange of data and documents among numerous stakeholders beyond customs authorities attracted the interest of the CEFTA Secretariat. This Secretariat has the ambitious goal of eliminating administrative trade barriers in the region. Since some CEFTA parties are not members of the World Trade Organization, the provisions of the Trade Facilitation Agreement do not apply to them directly. In response, CEFTA developed a dedicated instrument – the Protocol on Trade Facilitation. The updated version of SEED, known as SEED+, was intended to support the implementation of this protocol (CEFTA, 2021).

The SEED+ project is fully funded by the EU and jointly implemented by the CEFTA Secretariat and the Italian Customs and Monopolies Agency.

The development of SEED represents a significant step toward enhanced customs cooperation and efficiency in the region, laying a strong foundation for the modernization of customs procedures and data management methods required to ensure cross-border collaboration. Like any complex and multifunctional effective system, it has undergone several stages of development.

**The establishment phase of the SEED system (2008–2010).** Starting in 2008, a consortium led by the Italian Customs Administration with support from Eutalia received a mandate from the EU Directorate-General TAXUD to develop and implement a technical assistance project. An interesting fact is the use of the outcomes from this project during the implementation of another EU initiative titled "E-commerce tools and potential customs fraud risks" (grant no. 878563), supported by OLAF and the Italian Customs and Monopolies Agency with the assistance of Eutalia. This project was part of the HERCULE III 2014–2020 programme aimed at strengthening the capacity of EU Member States and IPA countries to counter financial losses to their respective budgets and security risks to citizens, which are increasingly associated with violations in the e-commerce sector, particularly involving under-invoicing in customs declarations (Eutalia, 2020).

One of the main conclusions at this phase was the realization of the necessity for political support in implementing the project and simplifying customs procedures, which was achieved through the harmonization and simplification of customs legislation. Through practical experience, it was discovered that a customs tariff with a limited number of rates and exceptions is much easier to administer

and ensures greater compliance from traders. In this case, all goods that require additional regulation or are critical for the economy are excluded from simplifications, and their customs control and clearance are carried out under stricter rules and require an additional set of documents. The vast majority of goods fall under unconditional and uniform application of the legislation and are processed more quickly. This also reduces the opportunities for customs officers to circumvent the law and collect unofficial fees for releasing goods. The use of such data exchange technologies leads to a reduction in corruption within customs administrations and complicates parallel imports or so-called state-sponsored smuggling.

At this phase, one of the main tasks in preparing for the automation and unification of customs procedures in all countries was the simplification of existing manual systems, procedures, and documents. In many customs administrations, the implementation of a computerized system overlapped with the traditional manual customs control and clearance system, which was not fully or partially replaced. This led to the duplication of procedures and an excessive number of administrative steps in processing customs declarations. In customs administrations where declaration processing procedures and systems are entirely or mostly manual, the number of administrative steps applied by customs is usually substantial (Corfmat & Castro, 2003).

During the implementation of the SEED system, which aligns with general principles of computerization or modernization of existing systems, an essential operation was the need to first review current systems, procedures, and documents that were conducted in the traditional way. In most cases, this review led to changes in legislation, staff relocation, and modifications in work habits, which caused resistance and partial sabotage of the modernization processes. If computer systems are layered on poorly organized or ill-conceived manual procedures, they become ineffective and are likely to exacerbate existing problems. Moreover, from the very beginning, these reforms must be carried out in accordance with automation requirements and internationally agreed standards and procedures.

The main areas of focus for achieving the goal included the development of the SEED concept with the support of the EU (through joint funding with the Italian Customs Administration and support from Eutalia), collaborative work with the customs administrations of the Western Balkans (Albania, Bosnia and Herzegovina, North Macedonia, Montenegro, Serbia, and Kosovo) toward the simplification of customs legislation and unification of customs tariffs, and the launch of initial pilot projects in cooperation with CEFTA and other regional organizations.

**Pilot phase of the SEED System Implementation (2010 to 2012).** Having analyzed prior experience with the implementation of complex management systems, it was decided to carry out a pilot launch of the SEED system to test it in practice, assess its effectiveness and make necessary adjustments. A multistage and gradual integration model was developed for this purpose. The goal was to optimize customs procedures through systematic electronic data exchange prior to the arrival of goods, thereby reducing the time required for customs control and clearance at border crossing points and improving risk management capabilities. The project was also intended to enhance cooperation between customs administrations by accelerating the exchange of crucial information for combating smuggling and organized crime in cross-border transport. Furthermore, the subsequent development of the system, specifically the creation of the "Green Corridors" initiative, allowed for the expedited processing of essential goods, especially during crises, which proved to be a significant advantage during the COVID-19 pandemic.

When analyzing the experience of the Western Balkans, it is also important to highlight the case of Serbia and Kosovo. Serbia did not officially recognize Kosovo's independence, declared in 2008, which complicated customs and border procedures. Due to weak border control, numerous smuggling schemes emerged. The absence of a unified control system negatively affected regional trade and economic development. Tensions between the Serbian and Albanian populations created additional challenges for cooperation. In 2011, under the auspices of the EU, the first agreement on Integrated Border Management (IBM) was reached between Serbia and Kosovo. Its purpose was to ensure joint management of border crossing points and to remove barriers to trade. Despite the agreement, its implementation faced difficulties that were anticipated but quite difficult to resolve. In northern Kosovo, Serbian communities did not recognize the agreement, which led to road blockades and attacks on customs posts. Joint operations at border points were conducted under conditions of high tension. Differences in legislation and customs procedures hindered system harmonization.

Initially, SEED was used for exchanging basic customs declarations between Serbia and Kosovo. Cases of double declaration of goods were reduced. Kosovo and Serbia had different customs management

systems, which required further adaptation of SEED. The level of integration was limited compared to other Western Balkan countries due to political disagreements and reluctance to compromise and make concessions. Risks of information leakage were monitored due to tensions between the parties.

One of the significant problems was the incomplete construction of the remaining permanent crossing points according to the Integrated Border Management (IBM) Agreement between Serbia and Kosovo. Political events and differing interpretations of the IBM structure hindered progress in establishing these crossing points, which are crucial for the effective functioning of SEED. Currently, only two crossing points have been completed – Mutivode/Mutivode and Merdare/Merdare. The dual interpretation of the IBM structure created another issue. For Serbia, IBM is viewed as an administrative line, whereas Kosovo considers it an international border. This discrepancy complicates cooperation and seamless data exchange between the two countries, ultimately affecting SEED's efficiency.

Another important obstacle is the creation of a reliable technological foundation for SEED. There is a need for investments in infrastructure and technologies capable of supporting electronic data exchange and ensuring secure communication. Such technological advancements are vital for improving the overall efficiency of customs procedures and strengthening the fight against illicit trade.

Despite these and other identified shortcomings in the system's operation, it demonstrated its effectiveness and great potential for use. Based on the system, it is possible not only to automate processes of risk analysis, customs control, and clearance, as well as customs data exchange (cargo declarations, inspection results), but also to use it as a platform for other government agencies and international organizations. Thus, the system proved its efficiency in reducing delays and improving data processing accuracy. Feedback from customs authorities was collected for further enhancement of its functionality.

To promote a system that has proven its effectiveness, innovativeness, and convenience, it becomes necessary to scale and expand both its functionality and the number of participating parties. Let us record the system's achievements at this phase.

For the effective use and implementation of the SEED system, the necessary legal and organizational conditions were established. At the initial stage, each pair of neighboring countries signed bilateral memoranda on the mutual exchange of customs information, based on which joint operating instructions for the system were developed.

Between 2017 and 2019, the CEFTA countries (Central European Free Trade Agreement) signed the multilateral Additional Protocol 5, which regulated data exchange among all parties and established uniform requirements for such interaction. According to the provisions of Protocol 5, CEFTA parties are obliged to exchange information contained in customs declarations and accompanying documents prior to the arrival of goods in the customs territory of the destination country, with the aim of simplifying procedures and reducing formalities during clearance.

Thus, SEED effectively implements the protocol's requirements in practice by providing the technical infrastructure for continuous automated pre-arrival data exchange between the Balkan customs authorities. Each beneficiary customs administration adopted operational guidelines and instructions regarding the use of the SEED system.

The existing IT infrastructure and system operate 24/7 and fulfill their role by providing automatic matching of customs data and an alert module for pre-arrival information.

The SEED infrastructure includes the following: 7 SEED nodes (Tirana, Banja Luka, Podgorica, Skopje, Belgrade, Pristina, Rome), each consisting of SEED servers and communication equipment – one located within each administrative IT system and the other at the Italian Customs premises in Rome. Each SEED node comprises a SEED application server, which is connected to the internal Customs Declaration Processing System (CDPS) of the customs administration.

This architecture enables customs authorities to automatically send and receive data about goods movement from the start of the customs procedure in the country of departure to the moment of arrival in the destination country. Data exchange channels between nodes are established via the public Internet using Virtual Private Networks (VPNs); there are 9 direct bilateral data exchange channels plus 2 links to an "intermediate server": Pristina – Rome and Belgrade – Rome. These connections cover all border crossing points in the region (CEFTA, n.d.-a).

At each border crossing, neighboring customs authorities have an agreed-upon set of data regarding the cargo exiting from one side and entering on the other. SEED matches the corresponding records ("paired" export-import declarations) and automatically signals any discrepancies or absence of the expected cargo.

This data matching mechanism helps identify inconsistencies in declared information before the border crossing and enables a prompt response to potential violations.

**SEED System Scaling phase (2013–2021).** The logic of further development involved expanding functionalities and integration capabilities with other systems. The SEED system proved to be quite reliable and demonstrated stable operation over a long period, which laid the foundation for developing phytosanitary control systems and technical modules enabling cooperation with other platforms within the European community. Another focus was the integration of countries that are not members of the European community but have contractual relations with Balkan countries. A particularly notable project aimed to strengthen the development of functional, efficient, and integrated border management systems in the Western Balkans and Turkey by enhancing inter-agency, bilateral, and regional cooperation and coordination. This project evolved into SEED+.

A one-way electronic data exchange was established between the customs administrations of the Western Balkans and EU countries as follows: North Macedonia and Greece; Albania, Montenegro, and Italy; Montenegro, Bosnia, and Croatia.

The rationale for using this particular data exchange model is clear and reasonable, as existing EU regulations prohibit the systematic exchange of customs data between EU member states and third countries.

The SEED+ system has been piloted for data exchange between:

Lithuania – Belarus (empty trucks, limited data set, full data set for volunteers);

Ukraine – Romania (empty trucks);

Moldova – Romania (empty trucks).

The EU is also testing the use of the SEED+ system in the countries of the Eastern Partnership, an initiative of the European Commission aimed at strengthening and deepening political and economic relations among six Eastern European and South Caucasus countries (Armenia, Azerbaijan, Belarus, Georgia, Moldova, and Ukraine).

Having such a powerful tool at their disposal, the leaders of the Western Balkan countries at the Sofia Summit in November 2020, co-chaired by Bulgaria and North Macedonia within the framework of the Berlin Process, decided to use it as the main platform for creating "Green Corridors" (DG NEAR, 2020).

"Green Corridors" were established at the onset of the COVID-19 pandemic to prevent shortages of essential goods, including food products. Thanks to information exchange between control authorities before the arrival of goods at border crossing points, document checks can be conducted prior to the arrival of essential goods, and inspections (if needed) can be organized more efficiently using specific resources tailored to the type of transport and category of goods. As a result, carriers transporting essential goods were granted priority passage through the Western Balkans. The system is still operational, and the results of its work can be viewed on the official website (CEFTA, n.d.-b).

**Current phase of the SEED system (2022 – present).** Building on the experience of implementing the "Green Corridors" and leveraging the technical capabilities of the SEED+ platform – more precisely, its administrative, technological, and informational advantages – an additional module called the "Blue Lanes" was proposed for integration. This initiative aimed to improve and simplify maritime connectivity between Albania, Montenegro, and Italy by utilizing all the capabilities of SEED+. On September 9, 2022, Mr. Genti Gazheli, Director General of the Albanian Customs Administration, Mr. Rade Milosevic, Director of the Tax and Customs Administration of Montenegro, and Mr. Marcello Minenna, Director General of the Italian Excise Customs and Monopoly Agency, signed Memorandums of Understanding in Rome regarding electronic data exchange between these institutions. This event also served as an opportunity to discuss the future development of the "Blue Lanes" initiative and trade relations in the Adriatic Sea region (Transport Community, 2022).

Thus, the SEED and SEED+ systems have laid the foundation for building trust and integration among customs administrations in the region. The joint IT system effectively compelled six different agencies to unify their approaches to data exchange, harmonize message formats, interaction protocols, and standards for border inspector operations. This facilitated the launch of other joint control initiatives. For example, joint border crossing points called One-Stop-Shops have started operating between some Balkan countries, where customs officers from two states conduct inspections together using a unified information database, largely made possible because SEED already provided a shared picture of each

shipment. Data exchange also extends to combating customs violations. By recording in SEED attempts of non-declaration or discrepancies in the weight or value of goods, countries promptly alert each other about potential fraud schemes. For instance, Albanian customs officers can notify their colleagues in Montenegro in real time about a suspicious shipment heading their way if they detect a discrepancy in declared value within the system. According to expert assessments, such cooperation through SEED has become an effective mechanism for improving the results of law enforcement operations. The number of successful joint customs actions against smuggling has increased, with millions of units of counterfeit and illegally imported goods seized. Moreover, participation in SEED has prepared Western Balkan customs for the implementation of European integrated border management approaches. Information exchange now occurs not only between customs administrations but also, when necessary, SEED data can be used by other control agencies such as tax authorities, border police, and sanitary inspections, creating a comprehensive approach to border supervision.

Implementation of SEED has significantly improved the efficiency of customs authorities in the Western Balkans and contributed to increased transparency in their operations. Thanks to the automation of information exchange, the customs control process at borders has been considerably accelerated. Customs offices receive data on incoming cargoes in advance, enabling them to prepare for clearance prior to the physical arrival of transport vehicles. This reduces the time required for document verification and goods release, which is particularly crucial for perishable or critically needed shipments. Due to SEED, the average border crossing time for cargo has decreased. According to CEFTA reports, the use of the system has been one of the factors leading to a substantial reduction in queues and delays at border crossing points in the region. Overall, the acceleration and simplification of procedures contribute to the growth of trade turnover between Balkan countries. SEED stakeholders note the positive impact of regular data exchange on the dynamics of intra-regional trade. Alongside increased speed, transparency in customs processes has also improved. Data on every export and import transaction is simultaneously reflected in both participating countries, which prevents concealment or non-reporting of goods during border crossing. Previously, unscrupulous entities could attempt to declare cargo for export in one country to claim VAT refunds, while completely omitting import declarations in the neighboring country's border. Currently, such fraud schemes are easily detected by SEED's VAT control module. Automatic matching of declarations minimizes opportunities for corruption and human error during information exchange. Data is transmitted directly between systems, thereby preventing inspectors from overlooking undeclared goods in exchange for bribes. As highlighted by SEED developers, the electronic transmission of pre-arrival information limits the potential for procedural manipulation at the border, thus mitigating corruption risks and promoting integrity.

Customs administrations have increasingly relied on risk management and data analytics rather than comprehensive physical inspections, which also reflects qualitative improvements. Regular information exchange between countries enables the creation of a shared database on goods movements and the history of potential violations. Based on this, customs officers are better equipped to assess risks and select suspicious shipments for more detailed control. Overall, SEED has demonstrated a significant positive impact on the efficiency and effectiveness of customs administration in the region. Enhanced monitoring of goods movements has led to an increase in detected violations and prevented cases of smuggling. In particular, automated data matching allows customs officials to immediately identify if a shipment has left one country but has not appeared in neighboring countries – this is a clear indication of illegal unloading or importation bypassing controls. Such information activates border and law enforcement agencies to initiate investigations. As a result, the number of seizures of illegal goods and arrests of smugglers in cooperation between Balkan customs authorities has increased, while customs revenue has grown due to the reduction of "grey" market flows.

The system has also contributed to the improvement of post-audit control. Data on all transactions are stored in the SEED database and can be used for subsequent analysis, inspections, and audits of customs clearance after the release of goods. Notably, the implementation of SEED occurred alongside global trends toward the digitalization of customs administrations. According to the World Customs Organization (WCO), the concept of "Digital Customs" envisages replacing paper-based procedures with electronic ones, enhancing control efficiency, and facilitating processes for both businesses and customs authorities. The Western Balkans experience demonstrates that, given appropriate political will and partner support, digital systems like SEED can become powerful tools for ensuring transparency and legality at the border.

Like any progressive system, SEED continues to evolve, responding to increasing challenges, becoming more versatile, and being utilized by various public authorities. This evolution is evident in SEED's expansion of data scope and participants in the information exchange. SEED is gradually transforming from a purely customs-focused platform into an inter-agency system. Within the SEED+ initiative, integration with the European cargo certification system TRACES NT is planned to enable automated electronic exchange of veterinary, phytosanitary, and other permit documents. This will allow veterinary and sanitary services in the Balkans to connect to the shared system and obtain the necessary certificates for goods online prior to their arrival. Such integration will facilitate joint cargo inspections and create a unified information environment for all border agencies, thereby reducing duplication of checks and accelerating the release of goods (CEFTA, n.d.-c). Moreover, the number of direct communication links between administrations will increase: additional secure data exchange channels will be established so that every pair of neighboring customs authorities will have dedicated protected connections. In the current version, some traffic is routed through a central node. This enhancement will improve the system's reliability and throughput capacity.

The accession to the EU serves as a key reference point for the Balkans, thus customs regimes must gradually align with EU standards. SEED+ is being developed with consideration for compatibility with European systems and EU regulatory requirements. Eventually, when individual Western Balkan countries join the EU Customs Union, the current regional system should either merge with the pan-European data exchange networks or ensure seamless interoperability with them. Currently, the objective is to achieve maximum interoperability-specifically, enabling data entered once to be reused across different systems without redundant re-entry. This aligns with the principles of simplification of formalities enshrined in Protocol 5, such as the "single window" concept and the exchange of information between customs and other agencies.

Another important aspect is the mutual recognition of Authorized Economic Operators (AEO) between Balkan countries and the EU. If an enterprise holds trusted AEO status, its shipments may be subject to fewer inspections. In the future, harmonizing AEO criteria and exchanging information about such operators through SEED+ will facilitate trade simplification for compliant businesses. Overall, continued integration efforts in the customs domain and the reduction of non-tariff barriers remain critically important for the Balkan economies. Analysts note that the region has yet to fully capitalize on the benefits of trade with the EU, and deeper integration through the removal of non-tariff obstacles, procedural simplifications, and infrastructural development is necessary to realize its growth potential. The reform of customs administrations through the SEED system serves as an example of such a step toward reducing non-tariff barriers along the supply chain.

Future versions of SEED plan to expand data analysis and risk management tools at the regional level. The system already includes an analytics module that enables the creation of samples and reports based on various parameters (such as cargo types, routes, carriers, etc.) to identify trends and anomalies. Advanced technologies, such as Big Data and elements of artificial intelligence, may be implemented in the future for risk prediction. For example, analyzing large volumes of cross-border data could help automatically detect suspicious routes or behavioral patterns indicative of potential violations. This will strengthen the preventive function of customs authorities – rather than reacting post-factum, they will be able to anticipate certain types of fraud based on data.

Additionally, the exchange of statistical information on the effectiveness of risk-based approaches (e.g., the proportion of inspected and detained shipments) among all countries, as foreseen in CEFTA agreements, is beneficial. Regular reviews of common risk criteria and the exchange of best practices will enhance the effectiveness of control measures across all directions.

As noted, customs authorities must respond to the challenges posed by the rapid growth of e-commerce. Expert recommendations include the development of specialized modules for processing information on postal and express shipments, integration of SEED with the information systems of postal operators and courier services, and the implementation of automated algorithms for detecting schemes such as parcel splitting or undervaluation. The ECE project, implemented with the support of OLAF, collected information on IT solutions used in various countries for e-commerce control and has developed basic standards for data exchange (Eutalia, 2020). The next step should be the implementation of these standards within existing systems. For the Balkans, this could mean modernizing SEED with a focus on small shipments, for example, by including information on small parcels in pre-arrival declarations and utilizing

simplified declarations that will be automatically cross-checked between the sending and receiving postal offices. In this way, SEED will remain relevant and effective even amid changing trade realities.

Thus, the development strategy of SEED is focused on scaling up and deepening integration. The system is expected to gradually encompass all aspects of customs and related controls, including sanitary and phytosanitary measures. It aims to become not only a tool for exchanging primary data but also a platform for joint analysis and risk management, as well as to connect with the broader European customs information "ecosystem." This will contribute to the creation of a single economic space without border barriers in the Western Balkans, facilitating goods movement for businesses and ensuring an adequate level of control and security for governments. A notable example is the pilot project on the digitization of ATA carnets and their use.

**Conclusions.** The experience of the Western Balkans in implementing the SEED electronic data exchange system convincingly demonstrates the advantages of close customs cooperation supported by modern technologies for effective customs risk management. However, its scope is not limited to this area. Over more than a decade of operation, SEED has become an integral component of customs administration in the region, ensuring transparency and predictability of trade flows. The system has proven its effectiveness in accelerating customs clearance, reducing administrative burdens for compliant businesses, and enhancing the efficiency of controls. Thanks to SEED, numerous violations have been detected and prevented, and the scale of smuggling and value added tax fraud has been reduced. An important achievement is the increased trust among customs authorities in the Balkan countries. Daily data exchange has strengthened mutual understanding and laid the groundwork for the future integration of their customs procedures into EU law. In a context where regional economies are striving to recover from the impacts of the pandemic and cope with the turbulence caused by Russia's military aggression against Ukraine, tools like SEED help maintain the stability of food and goods supplies, mitigating external shocks for domestic markets. Nonetheless, SEED is not a panacea or a static structure; rather, it is an evolving platform designed to adapt to changing needs. To continue meeting contemporary needs, the system must evolve by expanding its functionality and overcoming existing limitations. The Balkan countries have already taken steps in this direction by implementing the provisions of CEFTA's Additional Protocol 5 on data exchange and procedural simplification. With EU support, SEED+ has been launched with the aim of further automating and integrating various aspects of border control, from customs declarations to veterinary certificates. Thus, the region is preparing for its future accession to the EU single market by building the necessary IT systems and legal frameworks now. The SEED case exemplifies how digital solutions can bring states together to achieve a common goal – facilitating trade and ensuring customs security through improved risk management. The accumulated experience can be applied both in Ukraine and other parts of the world where cross-border customs cooperation needs to be established. Ultimately, the synergy of reforms and technologies, as demonstrated by SEED, confirms that customs borders are becoming informationally transparent, benefiting businesses, governments, and society as a whole. This fosters trade development, reduces opportunities for shadow schemes, and brings countries closer to best global practices in customs risk management.

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## СИСТЕМА SEED В УПРАВЛІННІ МИТНИМИ РИЗИКАМИ: ДОСВІД ЗАХІДНИХ БАЛКАН ТА ПЕРСПЕКТИВИ ДЛЯ УКРАЇНИ

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***Мета статті.*** *Стаття має на меті проаналізувати досвід впровадження та функціонування системи SEED у країнах Західних Балкан як інструменту управління митними ризиками, оцінити її вплив на ефективність митного контролю, регіональне співробітництво та міжнародну торгівлю, а також визначити можливості й перспективи застосування подібної системи в Україні.*

***Методи дослідження.*** *У статті використано метод компаративного аналізу для вивчення досвіду країн Західних Балкан щодо впровадження системи SEED, зокрема її впливу на ефективність митного контролю та регіональну інтеграцію. Застосовано метод кейс-стаді на прикладі Сербії, Косово та інших країн, що ілюструє технічні, політичні та організаційні аспекти функціонування цієї системи. Використано метод експертних оцінок і дані міжнародних організацій (ЄС, CEFTA) для аналізу ефективності SEED у контексті боротьби з контрабандою та спрощення митних процедур. Також застосовано історичний метод для відстеження еволюції системи, починаючи від пілотних проєктів*

*до сучасної версії SEED+. На основі зазначених методів сформульовано висновки щодо можливості адаптації балканського досвіду в Україні.*

***Результати.*** *У статті досліджено досвід країн Західних Балкан щодо впровадження системи SEED як інструменту управління митними ризиками. Проаналізовано вплив цієї платформи на ефективність митного контролю, спрощення процедур зовнішньої торгівлі та зміцнення регіональної інтеграції. Особливу увагу приділено ролі електронного обміну даними в сприянні міжнародній торгівлі та забезпеченні безпеки. На прикладі Сербії, Косово та інших країн показано, як SEED сприяє автоматизації процесів, скороченню часу очікування на кордонах і поліпшенню міждержавної співпраці. Розглянуто етапи розвитку системи – від пілотного тестування до масштабування у форматі SEED+, а також можливості її інтеграції з європейськими митними платформами. Окремо висвітлено технологічні, організаційні та політичні виклики, з якими стикалися країни регіону під час упровадження системи. Також розглянуто перспективи адаптації цієї системи в Україні з урахуванням її євроінтеграційних прагнень.*

***Висновки.*** *Досвід країн Західних Балкан із впровадження системи SEED свідчить про ефективність такого формату електронного обміну даними у сфері управління митними ризиками. Система SEED також сприяє прискоренню митного оформлення, зменшенню кількості порушень митних правил і зміцненню довіри між митними адміністраціями. Обґрунтовано важливу роль системи SEED для регіонального митного співробітництва, спрощення процедур і забезпечення безпеки зовнішньоторговельних операцій в умовах криз. Отримані результати підтверджують доцільність вивчення та адаптації балканського досвіду для потреб України.*

**Ключові слова:** електронний обмін даними, митний контроль, зовнішня торгівля, Європейський Союз (ЄС), цифровізація митниці, спрощення митних процедур, регіональна інтеграція, контрабанда.