

# Consequences of the Functioning of the New Computerised Transit System (NCTS) for Customs Logistics

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**Abstract:** The growth in international trade volumes and the digitalization of customs procedures make the study of the of NCTS's impact on the development of customs logistics in the context of common transit relevant. The purpose of the article is to study the functioning of NCTS and its impact on customs logistics, taking into account information-technological, operational-procedural, economic, organizational-institutional, and international aspects. The study uses methods of analysis and synthesis, systemic, structural-functional, comparative approaches, and the generalization method. The architecture and principles of the functioning of NCTS are revealed, its advantages and challenges for customs authorities and entities of foreign economic activity are systematized. The dynamics of the implementation of NCTS in Ukraine in 2022-2025 were analyzed, which showed a significant increase in the volume of transit declarations and increased integration into the European customs space. The main consequences of the functioning of NCTS for customs logistics were determined, in particular, increasing the transparency of transit flows, accelerating customs procedures, reducing transaction costs, and strengthening coordination between customs administrations. At the same time, challenges associated with the system's technical complexity, the need to develop digital infrastructure, cybersecurity and digital competencies of users were outlined. A conceptual model of the impact of NCTS on customs logistics was proposed. The theoretical significance of the results lies in the development of scientific approaches to the study of digital transit systems, and the practical significance lies in the possibility of using the results to improve customs policy and adapt the national customs system to common transit standards.

## 1 INTRODUCTION

In the current context of globalization of international trade and integration of national economies, digital technologies increasingly have a decisive impact on the efficiency of customs procedures and logistics chains. One of the key initiatives of digital transformation in the field of customs administration is the New Computerised Transit System (NCTS), which was developed within the framework of the Convention on a Common Transit Procedure and implemented in the territory of the European Union and other contracting parties. NCTS is an example of an information and communication system that provides electronic processing of transit procedures, integration of customs services, coordination of data on the movement of goods and the application of a single guarantee throughout the entire transit route.

NCTS is designed to increase the transparency of customs control, reduce administrative barriers, and contribute to the optimization of logistics processes in international trade.

The effectiveness of customs logistics, as a component of transport and logistics systems, directly depends on the efficiency of customs clearance of goods, the consistency of customs procedures between states, and the ability to adapt logistics models to the requirements of the modern digital economy. It is in this context that it is important to assess the consequences of the implementation of NCTS, since the system forms not only a technological platform, but also affects the organizational and procedural aspects of transit transportation. Analysis of the effects of NCTS allows us to understand how electronic transit declarations, a single guarantee and unified data

standards transform the interaction between customs authorities, foreign economic activity entities, and other participants in logistics chains.

Existing digital transit systems contribute to increasing the throughput capacity of customs checkpoints, reducing the time of customs clearance procedures, and reducing operating costs, which are critically important factors in increasing the competitiveness of national transport and logistics systems in international trade. At the same time, the experience of NCTS participating countries indicates the existence of certain challenges related to the requirements for technical integration, the level of digital competence of personnel and the adaptation of business processes of foreign economic activity entities to new standards of electronic interaction. Thus, a comprehensive assessment of the consequences of the functioning of NCTS from the standpoint of customs logistics is an urgent task of scientific and practical nature.

## 2 LITERATURE REVIEW

The issue of digitalization of customs procedures and implementation of electronic transit systems, in particular NCTS, is widely presented in modern scientific research in the field of customs and customs logistics. The works emphasize that information technologies provide a transition from paper procedures to electronic data exchange, increasing the transparency, speed, and efficiency of customs control, as well as contributing to the reduction of administrative costs and optimization of transit flow management [1], [2].

A significant part of the literature is devoted to the institutional and managerial aspects of the functioning of computerized transit systems. Documents of international organizations and scientific studies emphasize the system-forming role of NCTS in ensuring the continuity of international supply chains, strengthening customs security, and forming a new logic of customs logistics based on risk management and real-time information exchange [3], [4].

Some studies have focused on the impact of NCTS on transit logistics parameters. It has been proven that the automation of procedures and the standardization of electronic messages contribute to the reduction of border crossing times, the reduction of transactional and indirect logistics costs, and the increase of the competitiveness of international transport corridors [5], [6], [7].

The issues of international coordination and harmonization of transit regimes occupy a significant place in the literature. The authors emphasize that the functioning of NCTS is based on close information

interaction between customs administrations of different countries, which contributes to the unification of procedures and increased predictability of transit operations [8], [9], [10]. At the same time, the importance of adapting national customs systems and legislation to the requirements of the Convention on the Common Transit Procedure and EU standards is emphasized [11]. Comparative studies of transit systems consider NCTS as a reference model of electronic transit, which can be adapted in other countries, provided that there is proper institutional, legal, and technical preparation [12].

In general, the analysis of scientific sources indicates the complex impact of NCTS on customs logistics and forms a theoretical and methodological basis for studying its consequences in the context of increasing the efficiency of customs transit and integrating national customs systems into international supply chains.

## 3 METHODOLOGY

The methodological basis of the study is based on systemic, institutional, and process-oriented approaches to analysing the impact of NCTS on customs logistics. The research relies on a combination of qualitative and quantitative analytical methods, which enabled a comprehensive assessment of the institutional, information-technological, operational, and logistical aspects of the functioning of the common transit system. The logic of the study involved a sequential examination of the principles underlying the operation of NCTS, an analysis of its implementation in Ukraine, an evaluation of its implications for customs logistics, and the development of a conceptual model of the system's impact on international transit processes.

The information base of the study consists of regulatory and legal documents of the European Union, the World Customs Organization, official materials of the State Customs Service of Ukraine, as well as scholarly publications indexed in Scopus and other peer-reviewed academic databases. The analysis incorporated sources addressing the digitalisation of customs procedures, the functioning of NCTS, customs logistics, transit management, and risk management in international trade.

To achieve the stated objective, the study employed methods of theoretical generalisation, structural-functional, comparative, and statistical analysis. The structural-functional method was applied to examine the architecture of NCTS and the mechanisms of information interaction between customs administrations. Comparative analysis made it possible to identify the advantages and

disadvantages of the system's functioning for customs authorities and foreign economic operators. Statistical analysis was used to assess the dynamics of transit declarations processed under the common transit procedure in Ukraine during 2022–2025 and to identify structural changes between customs offices of departure and destination.

The empirical basis of the research was formed by official statistical data of the State Customs Service of Ukraine regarding the number of transit declarations processed within the framework of NCTS during 2022–2025. The analysis covered indicators related to declarations processed by customs offices of departure, customs offices of destination, and the overall volume of transit operations. This made it possible to assess the intensity of Ukraine's integration into the European transit area, identify trends in the development of digital transit, and reveal institutional features of the adaptation of the customs system to functioning under the common transit procedure.

To generalise the research findings, the method of conceptual modelling was employed, on the basis of which a model of the impact of NCTS on customs logistics was developed. The model was constructed according to the principle of a cause-and-effect relationship between the institutional preconditions for the functioning of the system, the digital mechanisms of NCTS, the transformation of customs procedures, and the strategic implications for international customs logistics. This approach enabled the systematisation of the key effects of transit procedure digitalisation and the identification of the main factors influencing the effectiveness of NCTS functioning.

#### **4.1 Content and Principles, Advantages and Disadvantages of the Functioning of NCTS**

The New Computerised Transit System (NCTS) is a European computer system designed to implement the common customs transit procedure within the European Union, the European Free Trade Association countries, and other contracting countries, including Ukraine, Turkey, and Serbia. The system operates on the basis of the Convention on the Common Transit Procedure, ensuring the movement of goods between the customs territories of the contracting parties without changing their customs status until the moment the cargo is presented at the customs office of destination. The basis of its operation is the electronic submission and processing of transit declarations, which replaces paper documents and a number of formalities inherent in traditional transit procedures. The system covers all

EU Member States, as well as countries that are parties to the Convention on the Common Transit Procedure, providing a single platform for international cooperation of customs authorities.

Architecturally, NCTS is implemented through national components that are integrated through a central domain in Brussels, which provides the connection of all European customs services and the exchange of electronic messages in real time. These messages contain data on cargoes, senders and recipients, means of transport, routes, and guarantees accompanying the movement of goods. This approach contributes to increased transparency of transit flows, optimization of logistics routes, and rapid assessment of customs risks.

The functioning of NCTS is based on the principles of digitalization of customs procedures, unification of information exchange, guaranteeing customs obligations, decentralization with central coordination, and monitoring and control in real time. The information and technical architecture of the system ensures the exchange of transit data between customs authorities, foreign economic activity operators, and central services in real time, which contributes to increasing the controllability of transit traffic and reducing administrative barriers.

The first fundamental principle of the NCTS is the digitalization of customs procedures, which involves the electronic submission and processing of transit declarations at all stages of goods transportation. The transit declaration submitted through the NCTS national interface contains a complete set of data on the goods, their sender and recipient, means of transport, route, as well as warranty obligations accompanying the movement of goods [5]. As a result of the acceptance of the transit declaration, the system generates a unique identification number, which is used to monitor the movement of cargo in the customs transit regime and further risk analysis within the framework of the accompanying security and customs control procedures.

The second key principle of the NCTS is the unification of information exchange, which consists in the integrated exchange of information between the customs authorities of the contracting parties, which is implemented through the central communication network and the national components of the NCTS. This involves not only the exchange of data on transit declarations but also the transmission of customs messages on the physical movement of goods, changes in transit status, and possible exceptions or incidents during transportation [4]. Thanks to a single information environment, administrations are able to coordinate customs operations at the international level, ensuring transparency, efficiency, and mutual trust between participating states.

Another important principle of the NCTS is the guarantee of customs obligations, which involves the provision of valid guarantees to secure possible customs payments in the event of a violation of transit rules. This guarantee can be both individual and general, including simplification in the form of a guarantee waiver for authorized operators, which is achieved on the basis of an assessment of their compliance with risk and financial reliability criteria [2]. This principle helps to balance the fiscal interests of states and the economic interests of businesses, reducing the costs of customs procedures and stimulating efficient activity in international trade.

The fourth principle of the NCTS operation is decentralization with central coordination, as it is architecturally implemented as a distributed computerized system with national portals for operations and a single central communication infrastructure, which allows integrating of local customs information systems and using of open data exchange protocols. [13]. Such a structure promotes scalability, allows national components to be adapted to common standards, and provides the ability to simultaneously process a large number of transactions in accordance with the needs of international trade.

The fifth principle of the NCTS operation is real-time monitoring and control, which consists in tracking the movement of goods within the framework of a single transit procedure. Customs authorities pay attention to ensuring the authenticity of data, the correctness of the route, and compliance of transit operations with established rules, which

significantly reduces the risks of fraud, smuggling, and violation of customs obligations.

The implementation of NCTS as a single computerized transit system between the countries party to the Convention on a common transit procedure presents customs administrations and foreign economic activity entities with a new level of information integration, which has both significant advantages and certain challenges. The advantages of the operation of NCTS for both groups of users stem from the principles of electronic exchange, standardized transit control, and simplified procedures that were incorporated into the system during its design at the level of the European Union and the Contracting Parties to the Convention. On the other hand, the disadvantages reflect the complexity of technical integration, the need for significant investments in technology and user skills, as well as the dependence on the stability of the IT infrastructure (Table 1) [6], [8], [11], [14].

Thus, NCTS offers significant advantages, including optimization of procedures, reduction of transaction costs, reduction of customs clearance time, and increased security of transit operations for both customs authorities and foreign economic activity entities. However, the challenges associated with the complexity of implementation, the need for training, technical support, and adaptation to changes require a systematic approach to managing these processes and further improving the relevant IT and legal infrastructure.

Table 1: Advantages and disadvantages of NCTS functioning.

Participant	Advantages	Disadvantages
Customs authorities	<ul style="list-style-type: none"> <li>▪ Ensuring electronic data exchange between customs authorities with prompt access to information on transit operations.</li> <li>▪ Reduction of customs transaction time thanks to a single transit declaration and guarantee for the entire NCTS territory.</li> </ul>	<ul style="list-style-type: none"> <li>▪ The need for significant investment in the IT infrastructure and staff training, which can be challenging for customs services with limited budgets or experience with digitalization.</li> <li>▪ Dependence on the availability and stability of the IT system: technical failures can lead to delays and the need to apply backup procedures.</li> </ul>
Foreign economic activity entities	<ul style="list-style-type: none"> <li>▪ Acceleration of customs procedures and reduction of transaction costs through electronic processing of transit declarations and interaction with customs authorities in real time.</li> <li>▪ Reduction of administrative burden and costs of submitting paper documents, which is especially important for small and medium-sized businesses.</li> <li>▪ Increased business confidence in electronic solutions, as evidenced by the growing use of NCTS and the expansion of transit operations volumes.</li> </ul>	<ul style="list-style-type: none"> <li>▪ The need to adapt business processes and the IT systems to the requirements of the new NCTS phases, which may require additional efforts and costs.</li> <li>▪ Insufficient digital competence of individual enterprises may limit the effective use of the system in the early stages of implementation.</li> </ul>

## 4.2 Analysis of the Implementation of NCTS in Ukraine

Ukraine officially joined NCTS on October 1, 2022, after the successful completion of the international assessment of the national IT system and the implementation of a set of regulatory, technical, and organizational requirements specified by the Convention on the Common Transit Procedure. A prerequisite for accession was Ukraine’s acquisition of the status of a country-participant of the Convention on the Common Transit Procedure [15] and the International Convention on the Simplification and Harmonization of Customs Procedures [16], which ensured the integration of the national customs system into the European transit space.

The implementation of transit operations within the framework of NCTS in Ukraine for the period of the fourth quarter of 2022-2025 indicates a deep institutional transformation of the customs and logistics system, which is manifested simultaneously in an explosive growth in the volume of transit declarations and a gradual structural restructuring between the customs offices of departure and destination (Fig. 1) [17].

The total number of processed transit declarations increased from 0.7 thousand in 2022 to 142.0

thousand in 2025, i.e., more than 200 times, while the dynamics are phased: a sharp expansionary jump in 2023 (41.2 thousand), further significant growth in 2024 (94.3 thousand), and relatively more moderate, but stabilized growth in 2025 (142.0 thousand). Such a trajectory is typical for the implementation of complex digital infrastructures, when the initial institutional adaptation and mass connection of market participants are replaced by the stage of operational saturation of the system.

A structural analysis of the distribution of transit operations between customs offices of departure and destination ones demonstrates the dominance of the first category throughout the period, but with a clearly expressed tendency towards a gradual equalization of the functional load. The volumes of clearance at customs offices of departure increased from 0.4 thousand to 96.5 thousand, while at customs offices of destination – from 0.3 thousand to 45.5 thousand. Accordingly, the share of operations at the destination stage increased from approximately 18.4% in 2023 to 32.0% in 2025, which indicates an increase in the role of the final stage of transit and a gradual increase in the institutional maturity of the system for controlling the movement of goods. At the same time, the preservation of a significant gap between the two links indicates incomplete harmonization of the transit cycle and potential asymmetry in administrative procedures.

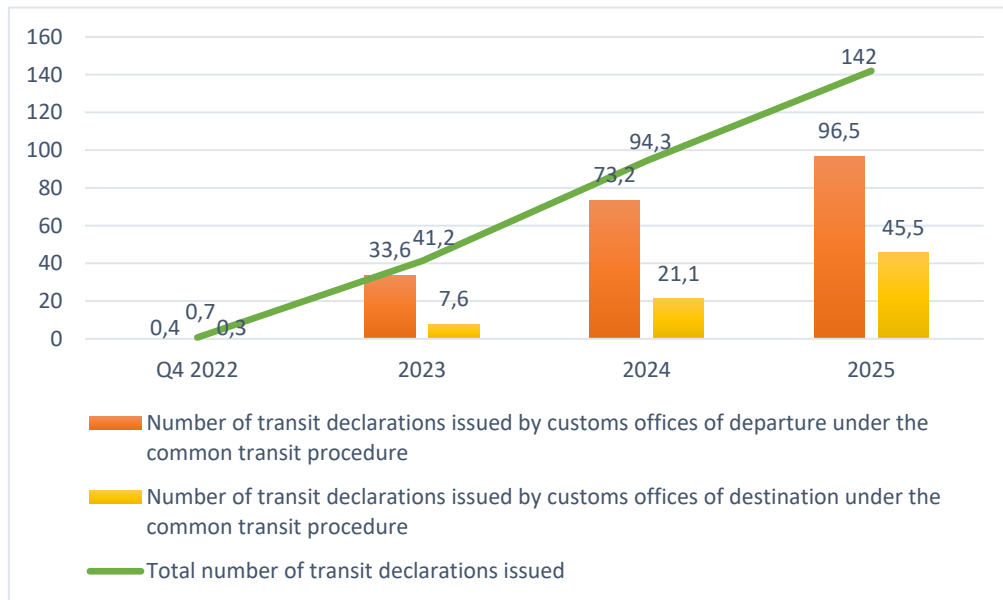


Figure 1: Dynamics of processed customs declarations within the framework of the Convention on the Common Transit Procedure in Ukraine in 2022-2025, thousands.

The identified trends form a double effect of the implementation of NCTS in Ukraine. On the one hand, the system provides a significant expansion of transit activity, which strengthens the country's positioning as an important transit corridor in European logistics chains. At the same time, the digitalization of procedures reduces transaction costs, speeds up customs clearance, increases the predictability of logistics operations, and minimizes the space for administrative discretion, which together contribute to increased transparency and reduced corruption risks. In addition, the gradual increase in the share of destination customs offices reflects the institutional strengthening of the system and increased efficiency of the final stage of customs control.

On the other hand, the empirical dynamics reveal a number of systemic limitations. The extremely rapid growth in 2023 placed a significant strain on the customs infrastructure, potentially leading to the uneven adaptation of regional customs offices and the formation of operational bottlenecks. In addition, the dominance of customs offices of departure over customs offices of destination throughout the period indicates incomplete unification of transit completion procedures and residual institutional asymmetry between the stages of the operational cycle. An additional challenge is the high dependence on the digital infrastructure of the system, which increases the importance of cybersecurity, stability of IT solutions, and continuous staff training. Finally, the volatility of growth rates in 2023–2024 reflects the adaptive nature of the system's development and complicates long-term forecasting of transit flows.

In conclusion, the functioning of NCTS in Ukraine is characterized by both a structurally positive dynamics of integration into the European customs space, and the presence of institutional and technological limitations. Its further effectiveness will be determined by the ability to ensure a balance between the scaling of transit operations, the alignment of the internal structure of customs administration, and the strengthening of the digital and organizational capacity of the customs system.

### 4.3 Consequences of the Functioning of NCTS

Based on Ukraine's experience in implementing NCTS, it can be argued that this system creates a new quality in the functioning of customs logistics, forming several groups of consequences that cover organizational, informational, operational, and strategic aspects of managing transit cargo flows (Table 2) [1], [3], [4], [7], [8].

Taken together, the consequences determine the efficiency of logistics chains in international trade and affect the interaction of customs authorities and foreign economic activity entities in the context of common transit. We propose to include the following consequences of the functioning of NCTS:

- 1) Informational and technological consequences. NCTS is an interconnected IT platform that provides real-time exchange of customs data between customs authorities of the countries participating in the Convention on a Common Transit Procedure. Such integration contributes to the unification of electronic transit declarations, automatic data processing, and reduction of manual operations, which significantly increases the speed and reliability of document processing. This eliminates information gaps between different customs systems and creates transparent conditions for monitoring transit operations, which is critically important for customs logistics, since data on cargo movements can be used to forecast flows and optimize routes [1]. In addition, new phases of NCTS (for example, Phase 5 and the planned Phase 6) provide for even greater integration with other customs services, including security and safety mechanisms, allowing customs authorities to carry out risk-based control without disrupting the logistics flow.
- 2) Operational and procedural consequences. The transition to NCTS means using a single transit declaration and a single guarantee for the entire route of cargo movement from the customs office of departure to the customs office of destination, eliminating the need to complete separate documents in each country at each transit point. This approach helps to reduce the time for customs procedures, reduce queues at checkpoints, and increase the throughput capacity of logistics corridors [3]. From the point of view of customs logistics, this means reducing administrative delays and increasing the efficiency of logistics processes, since the weight and quantitative parameters of cargo movement are recorded once and accepted by all participating customs offices. In addition, the system simplifies control over compliance with customs requirements, in particular due to a single data standard and guarantee management mechanisms, which reduces the likelihood of document fraud and counterfeiting. The electronic format minimizes the risk of human error, which has a positive effect on the quality of logistics procedures and the level of service.

Table 2: Consequences of the functioning of NCTS for customs logistics.

Group of consequences	Characteristics	Impact on customs logistics
Informational and technological	Ensuring the exchange of electronic transit declarations and cargo data in real time; integration of customs databases	Increases transparency of logistics flows; reduces errors associated with manual data entry; facilitates rapid decision-making regarding routes and risks
Operational and procedural	Use of a single declaration and guarantee for the entire transit route; automation of document control	Reduces customs clearance time; increases the throughput capacity of checkpoints; reduces administrative delays
Economic	Reducing transaction costs and optimizing logistics resources; the ability to forecast cargo flows	Reduces logistics costs for carriers and foreign economic activity entities; increases the competitiveness of international transportation
Organizational and institutional	Coordination of actions of customs services of participating countries; standardization of procedures and guarantees	Increases the coherence of customs authorities' actions; facilitates the integration of foreign economic activity entities into international logistics processes
International	Improving the security of transit chains; risk analytics; forecasting changes in logistics flows	Increases the resilience of logistics systems; allows routes and resources to be adapted to fluctuations in the international trade; facilitates strategic planning

- 3) Economic consequences. The economic effect of the implementation of NCTS is manifested in the reduction of logistics costs and increased competitiveness of international transportation. In particular, over the years of application of the NCTS system, Ukraine has significantly increased the number of transit declarations, which indicates its real impact on logistics activity and the reduction of barriers to cross-border transportation [8]. Integrated transit management allows operators to reduce costs associated with duplication of customs procedures, waiting at borders, and administrative red tape, which together contribute to the optimization of logistics chains and increased efficiency of international trade.
- 4) Organizational and institutional consequences. NCTS affects the structure of interaction between customs administrations and foreign economic activity entities, stimulating the development of new forms of cooperation and standardization of customs procedures. The unification of customs authorities in a common information space allows coordinating logistics processes within the framework of unified standards of the Convention on the Common Transit Procedure, which significantly enhances the consistency of actions of customs authorities and reduces uncertainty in customs and logistics operations [4]. It also launches mechanisms for unifying approaches to ensuring transit, authorizing operators, and optimizing resources

at border crossing points. Such changes contribute to the establishment of unified customs logistics practices at the international level, which significantly expand the opportunities for the development of transit corridors and the integration of national customs services into global logistics networks.

- 5) International consequences. At the international level, the functioning of NCTS contributes to the strengthening of security, predictability, and efficiency of transit chains, which is important for the global logistics strategies of states and enterprises. Enhanced digital interaction allows customs services to carry out sophisticated risk analytics, predict changes in flows, and adapt logistics solutions in accordance with fluctuations in international markets and transport corridors [7]. This is a significant factor in building resilient logistics systems that can withstand external shocks, including geopolitical risks or changes in global trade.

Analysis of the consequences of the functioning of NCTS from the perspective of customs logistics shows that the digitalization of transit procedures creates a comprehensive positive effect on the management of goods flows, information support for customs operations, reduction of logistical barriers and integration of customs administrations. At the same time, these changes transform logistics practices aimed at increasing the efficiency, security, and integration of the international logistics chains.

### 4.4 Conceptual Model of the Impact of NCTS on Customs Logistics

The practice of implementing NCTS in Ukraine shows that the system generates both positive effects – acceleration of customs clearance, reduction of transaction costs, and increased transparency of transit – as well as new institutional and technological challenges related to the adaptation of IT infrastructure, the need for digital competencies, ensuring cybersecurity, and harmonization of procedures between various participants in the transit process. This indicates the need to form a conceptual model that allows for a comprehensive reflection of the mechanisms of the impact of NCTS on customs logistics and systematize the relationships between its structural elements (Fig. 2).

The proposed conceptual model of the impact of NCTS on customs logistics reflects the cause-and-effect relationship between the institutional prerequisites for the functioning of the system, its digital and organizational mechanisms, operational transformations of customs procedures, and the final results for international customs logistics. The model

is built according to the logic of a sequential transition from input factors to integral logistics effects and allows for a comprehensive characterization of the impact of NCTS on the functioning of transit flows in the international environment.

The first block of the model forms the basic environment for the functioning of the NCTS. It includes institutional and legal, technological, and organizational prerequisites. The institutional component covers the Convention on the Common Transit Procedure, the harmonization of customs procedures, and the participation of the EU, EFTA, and other contracting parties in the single transit space. It is regulatory unification that provides the legal basis for the functioning of the common transit system and mutual recognition of customs procedures between states. Technological factors include the development of IT infrastructure, data standardization, ensuring interoperability and cybersecurity, without which the functioning of electronic transit is impossible. Organizational factors are related to the level of digital competence of personnel, change management, and coordination between customs administrations and entities of foreign economic activity.

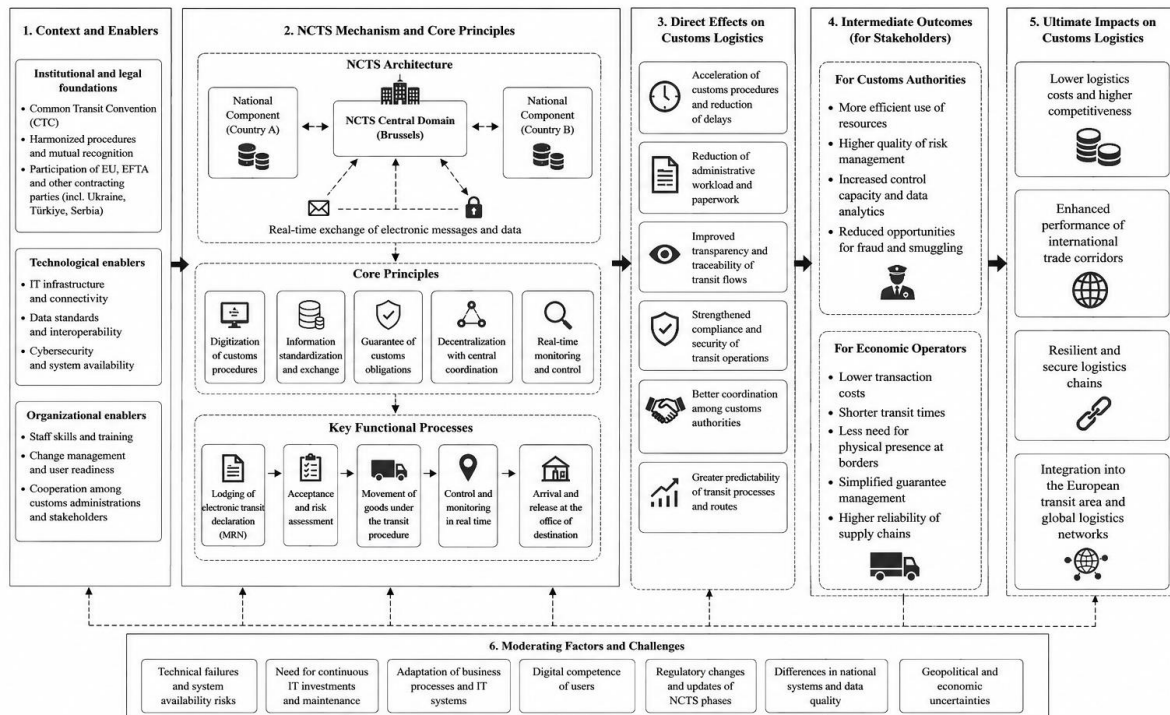


Figure 2: Conceptual model of the impact of NCTS on customs logistics.

The second block of the model characterizes NCTS as a mechanism for transforming customs logistics. The central element is the system architecture, consisting of national components and a central domain in Brussels, which provides for the exchange of electronic messages and transit data in real time. Such an architecture creates a single information environment for customs administrations of different countries, and ensures the continuity of transit operations.

Within this block, the basic principles of NCTS functioning are highlighted: digitalization of customs procedures, standardization of information exchange, guaranteeing customs obligations, decentralization with central coordination, and monitoring of transit operations in real time. Their implementation ensures the transition from traditional paper procedures to integrated digital management of transit flows. The key functional processes of the system include the electronic submission of a transit declaration, verification and risk assessment, movement of goods within the transit procedure, real-time control, and completion of transit at the customs office of destination. The combination of these processes ensures continuous digital support of cargo flows along the entire route of their movement.

The third block of the model reflects the direct consequences of the functioning of NCTS for customs logistics. First of all, the system contributes to the acceleration of customs procedures and the reduction of delays at the borders due to the automation of document flow and the use of a single transit declaration. At the same time, the administrative burden and the volume of paper procedures are reduced, which increases the efficiency of logistics operations. An important consequence is also the increase in transparency and traceability of transit flows, as information on the movement of goods becomes available to customs authorities in real time. This creates the prerequisites for strengthening control over compliance with customs rules, reducing the risks of fraud, and improving coordination between customs administrations.

The fourth block describes the intermediate results of the system for the main participants in the transit process – customs authorities and foreign economic operators. For customs administrations, NCTS provides more efficient use of resources, improved risk management, and expanded analytical capabilities based on electronic data. In addition, the system reduces opportunities for smuggling and documentary fraud through integrated control of transit operations. For businesses, the benefits are

manifested in reduced transaction costs, reduced transit time, simplified guarantee procedures, and increased reliability of logistics chains. This creates a more predictable environment for international trade and stimulates the development of cross-border transportations.

The fifth block of the model reflects the final strategic consequences of the implementation of NCTS for customs logistics. As a result of the digitalization of transit procedures and the integration of customs administrations, an efficient, transparent, and secure system of international transit is formed. This contributes to reducing logistics costs, increasing the competitiveness of transport corridors and integrating states into global logistics networks. At the same time, the system increases the resilience of logistics chains to external risks, and creates conditions for the strategic development of customs infrastructure in accordance with the requirements of the digital economy.

A separate place in the model is occupied by a block of modifying factors and challenges that may affect the effectiveness of the NCTS. These include technical failures and risks of system availability, the need for constant investment in digital infrastructure, adaptation of business processes and software, an insufficient level of digital competences of users, differences between national information systems, and the impact of geopolitical and economic risks. The presence of these factors indicates that the effectiveness of the NCTS depends not only on the technological capabilities of the system, but also on the level of institutional and organizational readiness of states and businesses to operate in a digital transit environment.

Thus, the proposed conceptual model demonstrates that the NCTS is not only a tool for electronic customs clearance, but also a comprehensive digital platform for the transformation of customs logistics, which integrates information, organizational, and economic mechanisms for managing international transit flows.

## 5 CONCLUSIONS

The study found that NCTS is not only a tool for digitizing customs procedures, but a comprehensive mechanism for transforming customs logistics, which combines information and technology, organizational, and economic elements of transit flow management. It was determined that the key principles of the system are digitization of customs procedures, unification of information exchange,

guaranteeing customs obligations, decentralized coordination, and real-time monitoring.

The analysis of the implementation of NCTS in Ukraine in 2022–2025 showed a rapid growth in the volume of transit operations and increased integration of the national customs system into the European logistics space. It was found that the functioning of the system contributes to increasing the transparency of transit procedures, reducing administrative delays, optimizing logistics routes, and strengthening the control capabilities of customs authorities. At the same time, a structural asymmetry between the customs offices of departure and destination ones was identified, which indicates the need for further harmonization of individual stages of the transit cycle.

The scientific novelty of the study lies in the systematization of the consequences of the functioning of NCTS for customs logistics in information-technological, operational-procedural, economic, organizational-institutional, and international areas. The proposed conceptual model allowed us to reflect the relationship between the institutional prerequisites of the system's functioning, digital transformation mechanisms, and strategic logistics effects.

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