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MANAGING THE FLOW OF PEOPLE AND GOODS AT THE BORDER - THE ROLE OF IT SYSTEMS IN IMPROVING THE EFFICIENCY OF CROSS-BORDER LOGISTICS

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Abstract. Contemporary challenges related to the management of the movement of people and goods in border areas present us with the need for effective border control, while maintaining the fluidity and efficiency of logistics processes. This article examines the role of information systems in improving the efficiency of cross-border logistics. It focuses on the ways in which advanced information technologies can support both border control processes and the logistical aspects of the movement of goods and people at the border. Through a review of existing IT systems, case studies and analysis of practices, this article identifies key challenges, benefits and potential innovations in the area of border flow management. The conclusions of this analysis can provide valuable guidance for practitioners, policymakers and researchers interested in improving logistics processes at borders using information systems.

Keywords: management; logistics; information systems; border areas

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1. Introduction and theoretical background

The border, which is a separate territory of a state, determines the spatial extent of its sovereignty. On the one hand, it is a separating factor, when certain conditions are met, it acts as a "filter" and a zone of economic contacts between countries (cross-border cooperation) (Ratti, 1996). Boundaries are also defined as a dividing line between areas with different political, administrative, cultural, social, institutional, competence, environmental or other affiliations that form the basis or reason for the distinction. As Komornicki (2022) rightly points out, the border can divide and unite, which means that it can be a barrier or a zone of cooperation. One of the basic functions of the border is to control all flows through the state border, the so-called "permeability" of the border. It applies to both people and goods. The level of permeability of the border varies from the possibility of free movement of people and goods across the border or burdened with special permits and restrictions. It is a combination of two factors: the degree of formalisation of the border (e.g., visa regulations, customs tariffs) and the degree of development of cross-border transport infrastructure (e.g., the number and condition of communication routes crossing the border, the number of border crossings). Increasing the level of permeability of the border (formalization) creates new conditions for the development of border areas: positive and negative.

There is a separate strand of literature devoted to the cross-border logistics (e.g., He, Wu, & Choi, 2021, Sun, 2021; Xie, Feng & Zhou, 2022; Bandaranayake, Kiriden, & Kulatunga, 2022; Ye, 2024).

An example of a border fully permeable to Polish is Schengen. It is here that a catalogue of measures to facilitate border controls in both passenger and freight traffic has been applied. The Schengen Borders Code provides for the free movement of persons (Commission communication, 4 March 2022).

Due to its location, Poland has a dual function, in relation to the EU Member States, securing the EU's external border by the Polish Border Guard, which is a guarantee of securing the interests of the entire "area without borders". The second function is cooperation with third countries (including currently with regard to Ukraine (Shahlon-Pszenny, 2024)). The analysis used the method of statistical analysis and legal comparisons in this area.

2. Examples of comprehensive EU integrated border management policies

The authors presented the forms of implementation of the integrated border management policy of the European Union on selected examples. The discussed programmes and undertakings concern, m.in the fight against organised crime and evolving threats, protection against terrorism, cooperation and exchange of information between authorities, as well as facilitation of legal border crossings and effective prevention of illegal border crossings by refugees.

The following assumptions for cooperation between EU countries in the field of combating organised crime have been developed, m.in in the EU Security Union Strategy for 2020-2025 (Vasilkov et al., 2023), which was adopted by the Justice and Home Affairs Council (JHA) in 2020. These include the security environment of the future, countering evolving threats, protection against terrorism and organised crime, and a strong European security ecosystem. The fourth area focuses on issues related to cooperation and exchange of information between authorities as the most effective tool for combating crime and terrorism. It then underlines the importance of strong external borders, guaranteeing the integrity of the Schengen area and the security of citizens, with an emphasis on modern and effective management. Cooperation and exchange of information responsible for the security of government and local services and bodies. This involves, m.in, the use of modern technologies and biometrics in documents, the interoperability of information systems used by services in EU countries, and the development of future-oriented tools. (EU Security Strategy 2020-2025).

Subsequently, the Modernization Program of the Police, Border Guard, State Fire Service and State Protection Service in the years 2022-2025 was implemented." In order to ensure high security of SG telecommunications systems and to maintain high network availability in order to enable constant communication with border control systems, network equipment and end devices for the SG telecommunications system were purchased as part of the project. The implementation of the project made it possible to increase the functionality and ensure the continuity of operation of the Border Guard's telecommunications system, as well as to ensure efficient access for users to the central IT systems of the Border Guard and the implemented software. In the area of ICT security, the Border Guard operates a number of classified networks and ICT systems, including the Central System for the Processing of Classified Information and the Integrated System for Monitoring, Response and Protection against ICT Security Incidents KORUND.

Another example of a comprehensive European integrated border management policy is the implementation strategy (EUIBM 2023-2027). The main objectives are: facilitating legal border crossings, preventing unauthorised border crossings, preventing cross-border crimes. The implementation of the EUIBM's activities is based on a continuous readiness to respond to threats and to provide the necessary tools to respond to and manage any such threats at the external borders (Commission Communication, 2023).

3. The role of information systems in improving border logistics

The Border Guard m.in uses systems such as the Entry/Exit System (EES), the Schengen Information System (SIS), the Visa Information System (VIS) and the European Travel Information and Authorisation System (ETIAS) to improve the logistics of border crossing points (Zawadzka, 2019).

The Entry/Exit System (EES) aims to strengthen border control, prevent illegal immigration and facilitate the management of migrant flows. The EES contributes to the identification of persons who may not fulfil or no longer fulfil the conditions for residence and duration in the territory of the Member States. The EES is a centralised system that is interoperable at central level with the VIS and a uniform national interface for communication with Member State authorities. (Gajda, 2018). SIS The Schengen Information System (SIS) is the most widely used and the largest information exchange system for security and border management in Europe. (Meszaros, 2018; Bellanova & Glouftisios, 2022). The Visa Information System (VIS) is used to process data and decisions on applications for short-stay visas for the purpose of visiting or transiting through the Schengen area. (Gajda, 2023). The ETIAS (European Travel Information and Authorisation System) was established on the basis of Regulation (EU) 2018/1240 of the European Parliament and of the Council of 12 September 2018. Therefore, the primary purpose of the system is to "seal" the borders and prevent the entry of people who pose a threat into the territory of the Member States (Zawadzka, 2019).

ECRIS-TNC) - was established on the basis of Regulation (EU) 2018/1726 of the European Parliament and of the Council of 14 November 2018 on the European Union Agency for the operational management of large-scale IT systems in the area of freedom, security and justice (EU-LISA) (Lungu, 2020).

Eurodac, which has been in operation since 15 January 2003, is an EU-wide database of asylum seekers containing the fingerprints of irregular migrants. The purpose of this database is to help determine which country is responsible for examining an asylum application under the Dublin Convention. It is an important tool for the development of the Common European Asylum System. The system is used to determine whether a person apprehended for illegally crossing the EU's external border or staying illegally in a Member State has applied for asylum in the EU, Norway or Iceland. The Eurodac system comprises the Central Unit, initially operated by the Commission but now managed by the EU Agency for Large-Scale IT Systems (Jones, 2014).

Customs authorities in Poland use, m.in the following systems when carrying out border controls: Automated Export System (AES) – enables fully automated handling of export declaration and entry summary declaration (WDS), as well as exchange of information in electronic form between customs offices in the European Union. The system ensures that customs authorities carry out their customs supervision effectively.

Automated Import System (AIS) is an IT system used to handle all documents related to the import of goods, e.g. customs declarations and declarations, as well as statistical declarations. It is used to handle operations related to the import of goods into the EU customs territory. AIS improves business processes in imports and statistics of trade in goods between European Union member states (Wójcik & Rybicka, 2013).

The New Computerised Transit System 2 (NCTS2) is used to submit declarations for the transit procedure and to monitor transit operations by customs authorities (Odell, 2013). The system has been implemented in the European Union countries and in the countries parties to the Convention on the Common Transit Procedure (WPT Convention) the members are: EU countries, Liechtenstein, Norway, Turkey, Serbia, Macedonia, Iceland, and Switzerland.

Customs Information System (SIC) – was developed for the purpose of cooperation between customs services, as one of the three systems (Europol Information System and Schengen Information System). It was created in order to improve cooperation between police, border and customs services of the European Union Member States (Czermińska, 2014). The legal basis for its operation is the Convention drawn up on the basis of Article K. 3 of the Treaty on European Union, on the use of information technology for customs purposes (CIS) 1995). The system consists of a central database that is accessible to all Member States. The priority task of the system is to improve control and fight fraud, to ensure effective management of the control of goods at the external

borders. The programme supported trans-European computerised communication and information exchange systems, as they are essential for the functioning of customs administrations in the Community and for the exchange of information between them.

In order to improve border traffic, an integrated system of the Border Guard and the National Revenue Administration Digital Border has been created, which enables the transfer of data on checked travellers from the Border Guard databases to the databases of the National Revenue Administration. Therefore, the traveller presents the documents at check-in only to the Border Guard officer. The Digital Border System has replaced the previously used Integrated Border Handling System CAIFS II at the external border of the European Union. It has significantly improved the methods of handling people, vehicles and goods within road and rail border crossings and has expanded the possibilities of supporting the service with new types of traffic, i.e., border air traffic, sea ferry traffic, sea container traffic and sea freight traffic. From the point of view of the clients of the National Revenue Administration, the Digital Border system is to be a tool to support their business and tourist activities related to the movement of goods and people across the external border of the European Union. The Digital Border ensures efficient customer service at border crossings located at the EU's external border using automatic data exchange, automatic vehicle identification and traffic control mechanisms.

The Electronic Transport Supervision System (SENT) was developed to monitor the road and rail transport of the so-called "sensitive goods" and the trade in heating fuels is used by customs authorities in Poland (Szymanek, 2021). Legal acts regulating the control of the transport of goods subject to SENT: (Act, 2017; Regulation, 2019; Regulation, 2021; Regulation, 2022; Regulation, 2013). For the purposes of the implementation of the Act on Supervision Systems in Road and Rail Freight Transport and Fuel Trading, a register of SENT notifications has been created and is maintained in the IT system (Sarnowski & Lewandowski, 2021). The SENT register was created to enable electronic reporting. (Chackiewicz, 2021). From 1 July 2024, the regulations on the obligation to register foreign carriers performing international road transport in the SENT system will come into force.

The Technical Centre for Computer Forensics was established in 2015 as part of the HERCULE III project, which was 80% funded by the European Anti-Fraud Office (OLAF). It is used by customs authorities in Poland. Program implementation of computer forensics in the Customs Service No. OLAF/2015/D1/042, as a result of which equipment and specialized software were purchased, intended for collecting, retrieving, securing and analyzing digital data on various types of electronic media used by criminal groups. (Zimoch, 2018). The Centre provides: substantive and technical support for the customs administration in the field of computer forensics, equipment and software, development of procedures in the field of computer forensics, monitoring and implementation of new solutions in computer forensics, cooperation with other domestic and foreign services, law enforcement agencies and international organizations, conducting trainings, developing training materials, coordinating and supervising activities, testing the effectiveness of implemented processes and implemented solutions, issuing opinions on draft legal acts concerning computer forensics, implementation of uniform principles of operation in the field of computer forensics, participation in procedural activities in cases of crimes and fiscal offences, seizure and search of devices containing IT data or IT systems, preparation of reports on tests of IT devices or IT systems, analysis of data obtained by means of methods computer forensics, appearing before the court in criminal and penal fiscal proceedings as experts in the field of computer forensics, supporting implementation units in obtaining and securing digital evidence, preparing data and developing analyses in the field of cell properties. Technological progress and digitization apply to all uniformed services (Orłowska, 2023).

4. Selected statistical data of the Border Guard and customs authorities in the years 2020 – 2023

The Border Guard m.in uses systems such as the Entry/Exit System (EES), the Schengen Information System (SIS), the Visa Information System (VIS) and the European Travel Information and Authorisation System (ETIAS) to improve the logistics of border crossing points (Zawadzka, 2019). Both the Border Guard and the customs authorities keep their statistics on detentions during border and customs controls. These are mainly cases of attempts to smuggle excise goods into the EU. In order to illustrate the scale of the problem and the numbers of border traffic, the authors have compiled a compilation of statistical data for the years 2020 – 2023

on the border between the Republic of Poland and Ukraine. The presented data was mainly based on information provided by the Border Guard in terms of the number of travelers crossing the border, cars, trucks and other vehicles. Figures 1-3 present data on attempts to smuggle excise goods thwarted by customs authorities.

ALCOHOL (LITR)

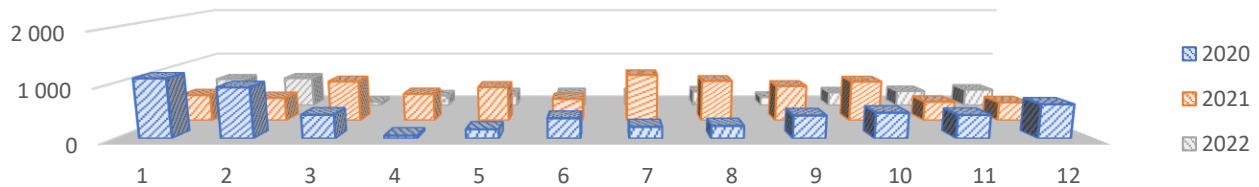


Fig 1. Excise goods seized by customs authorities at the EU's external border in 2020-2022 – alcohol in litres.

Source: Author's own elaboration based on the Security Monitor of the Eastern Border of the Republic of Poland of the EU External Border in 2020-2022

FUEL (LITER)

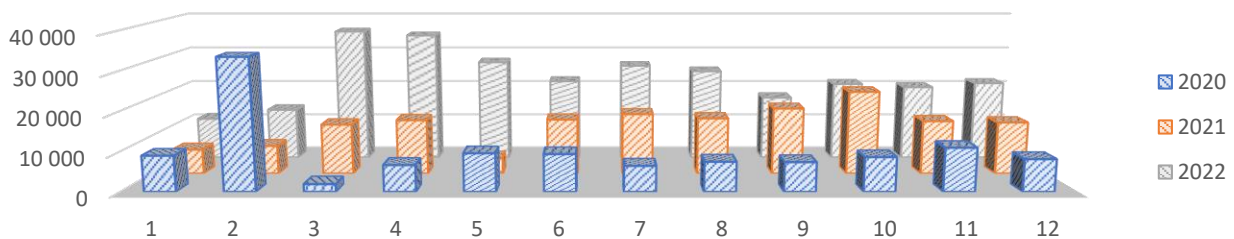


Fig 2. Excise goods seized by customs authorities at the EU's external border in 2020-2022 – fuel in litres.

Source: Author's own elaboration based on the Security Monitor of the Eastern Border of the Republic of Poland of the EU External Border in 2020-2022

CYGARETS (ART.)

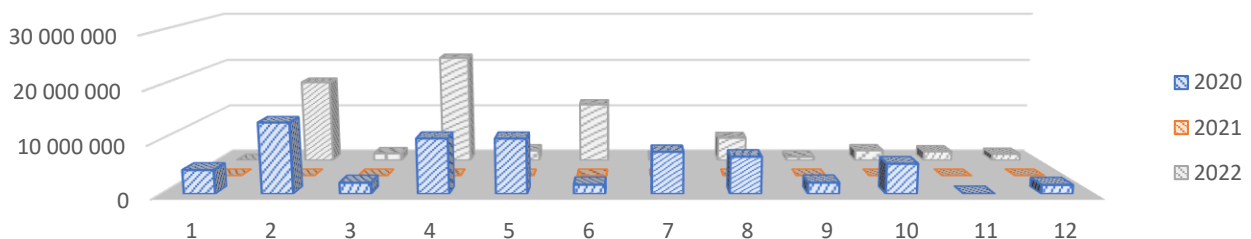


Fig 3. Excise goods seized by customs authorities at the EU's external border in 2020-2022 – papers in pieces.

Source: Author's own elaboration based on the Security Monitor of the Eastern Border of the Republic of Poland of the EU External Border in 2020-2022

According to data on the quantities of excise goods seized in the form of cigarettes, alcohol and fuel, the highest number of alcohol was seized at the EU's external border, 7351 litres, in 2021. The highest amount of fuel was retained in 2022: 277,510 litres. Fuel retention in 2021 represents 65.5% compared to 2022, while the highest number of cigarettes was seized in 2021 at 171,049,904. Seized cigarettes in 2020 account for 46.4% of cigarettes seized in 2022.

As an example of the volume of traffic at the border, the authors gave statistics from the border of Polish with the territory of Ukraine. The decisive factor influencing the sudden increase in border traffic in this region was the outbreak of the war in Ukraine on February 24, 2022. According to the information of the Border Guard, in 2022 the traffic on the border with Ukraine doubled from 8.7 million in 2021 to 17.3 million in 2022 (Monitor, 2023, p.2). Figures 4 and 5 show passenger and car border traffic on the border with Ukraine.

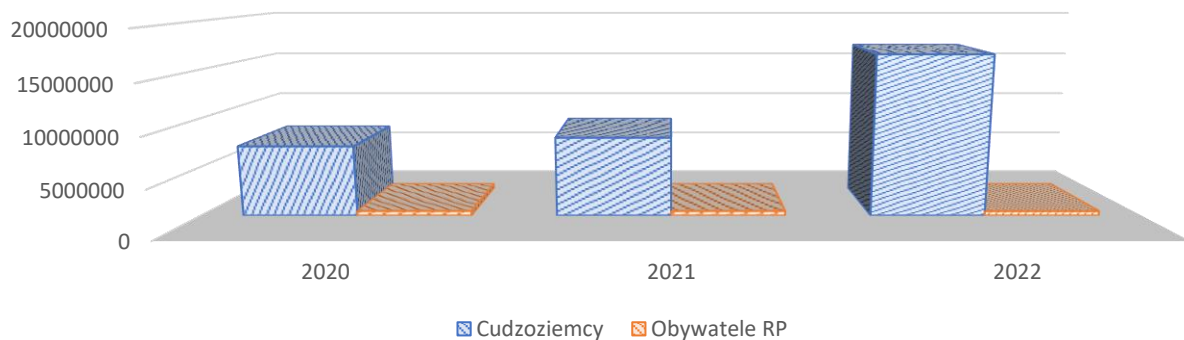


Fig 4. Passenger border traffic on the border with Ukraine – the number of border crossings by Polish citizens and foreigners in 2020-2022

Source: In-house analysis based on Border Guard statistics for 2020-2022, accessed: 10.11.2023

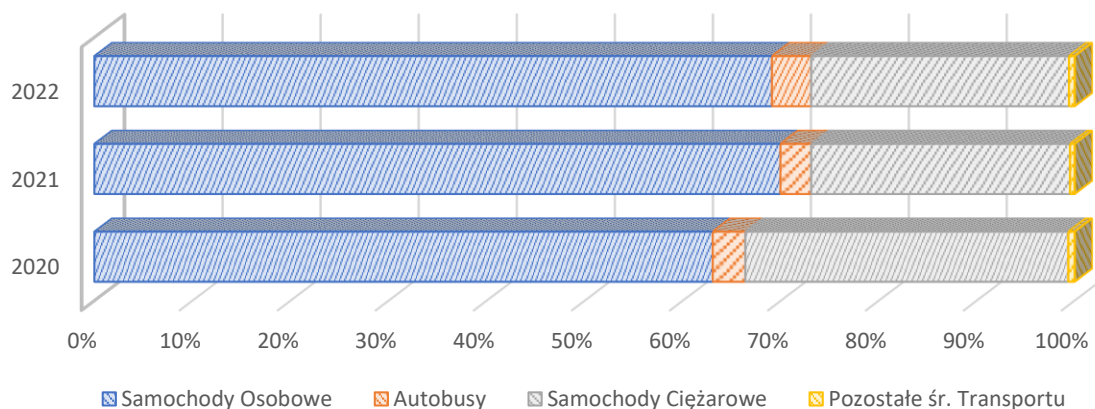


Fig 5. Border traffic of road transport vehicles on the border with Ukraine in 2020-2022.

Source: In-house analysis based on Border Guard statistics for 2020-2022, accessed: 10.11.2023

As already indicated at the beginning of the article, the National Tax Administration, the Border Guard, the Police, the Fire Brigade, the Veterinary Inspection, the Airport Security Guard, and the State Plant Health and Seed Inspectorate also operate on the state border. Border guards cooperate with state and local government authorities (develop strategies for action) (Chackiewicz, 2020).

Conclusions

An in-depth analysis of the role of IT systems in managing the flow of people and goods at the border allows us to conclude that they are an indispensable tool in improving the efficiency of cross-border logistics. The research carried out in this article clearly indicates that advanced information technologies can make a significant contribution to improving border processes, improving security and increasing the smooth flow of goods and people.

An analysis of existing IT systems used at borders, along with examples of best practices, shows the potential of these solutions and their positive impact on the efficiency of cross-border logistics. In particular, the ability to monitor and analyse data in real time, process automation and inter-institutional integration are key elements that enable a rapid response to changing conditions and the optimisation of the flow of goods and people.

However, in order to fully exploit the potential of information systems in border flow management, it is necessary to continuously improve and adapt these solutions to changing needs and challenges. The implementation of advanced IT systems should also be supported by adequate staff training and the provision of adequate technical and financial resources.

It is also worth stressing that effective management of the flow of people and goods at the border requires international cooperation and the peer-to-peer exchange of information and experience between the various actors involved in border processes.

The authors presented the activities of the Border Guard and the National Revenue Administration while performing activities at the external border of the EU. They discussed selected examples of integrated information systems used during border controls. Other services will be the subject of further considerations and analyses in subsequent studies. As an example of the integration of border service systems, the Digital Border implemented to improve border traffic by creating an integrated system of the Border Guard and the National Revenue Administration, which enables the transfer of data on checked travellers from the Border Guard databases to the databases of the National Revenue Administration. It is worth noting that integrated IT systems are also used in the broadly understood phenomenon of combating cross-border crime. Therefore, this article indicates the important role of information systems in improving the efficiency of cross-border logistics and emphasizes the need for further research and innovation in this field. We hope that the conclusions of this article will be valuable for practitioners, policymakers and researchers interested in improving flow management processes at the border.

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