

# Capitolul 12 – CERCETAREA METODELOR DE EVALUARE A MANAGEMENTULUI RISCURILOR ÎN CADRUL SERVICIULUI VAMAL BAZATE PE ANALIZA A BIG DATA

## Chapter 12 – RESEARCH OF RISK MANAGEMENT ASSESSMENT METHODS WITHIN THE CUSTOMS SERVICE BASED ON BIG DATA ANALYSIS

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### **Abstract**

*In the digital age, the abundance of data presents new avenues for risk assessment in various sectors. This article delves into risk assessment methods within the Customs Service that leverage big data analytics, aiming to provide a more comprehensive understanding of risks. It reviews machine learning techniques, predictive analytics algorithms, and neural network models, highlighting their strengths and limitations. The study also addresses the ethical aspects and challenges related to the confidentiality of commercial or personal data and the influence of these technologies on decision-making. The findings underscore the necessity for robust regulatory frameworks and transparent practices to harness the benefits of big data analytics in Customs risk management while safeguarding business-critical data.*

**Keywords:** customs service, risk management, machine learning, big data, national security

**JEL:** C55, G32

### **Introduction**

In the era of digital commerce, cloud computing, big data, artificial intelligence, customs, and other border authorities, government structures, and business processes are also being reshaped.

Border control departments rely on information technologies and big data to carry out effective policies in high cross-border trade risks, considering national priorities and resource availability. This is why customs administrations look at big data and implement it in their decision-making system. Unlike conventional data, big data covers a wide range of data. It can be structured and tailored or unstructured. Specific knowledge and skills are required to include such diverse data in customs operations. Advanced analysis techniques, which can improve the understanding of the latent risks associated with the subject matter of the controls, are one of the cornerstones of the analysis procedure. By analyzing big data, the customs authority performs a short- and long-term forecast based on a broader view of the situation. In this context, the predictive Analysis of risk management data within the Customs Service is correct and effective. This paper will research systems that can be used for predictive risk management analysis based on customs administration data. Predictive analytics tools for big data and their contribution to mass data management in customs structures will be researched.

### **Research purpose and method**

The studies whose research object is using big data or neuro-learning in the risk management of Customs Services are diverse (Hussam et al., 2020). A notable research method involves a distributed risk assessment system that uses the Local Outlier Factor (LOF) algorithm. This system helps customs authorities detect risky shipments early, minimizing the need for physical inspections and alleviating pressure on customs resources. Using big data allows the system to analyze patterns, improving the identification of potentially dangerous shipments without disrupting trade flows.

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Fan, Huan, Gang Li, Hongyi Sun, and T. C. E. Cheng emphasize the importance of aligning information processing capabilities with supply chain complexity and volatility to manage risks and improve performance (Huan, et al., 2017).

Giordani explores using AI and web crawling technologies to improve customs risk management in e-commerce. It focuses on the possibility of automating the detection of discrepancies between customs declarations and online product information. The system collects product descriptions, compares declared values with online prices, and flags suspicious entries for further inspection by authorities. This solution addresses the increasing complexities of e-commerce imports, especially from China (Giordani, 2018)

Laszuk, Mirosława, and Dana Šramková discuss the evolving role of customs law as an international trade balance between trade facilitation and security assurance. The authors explore how customs authorities face regulatory compliance challenges, technological advances, and security risks, particularly in the context of globalization and increased trade flows. Researchers highlight the tension between trade facilitation and security measures, calling for modernized legal frameworks in customs law (Laszuk et al., 2021)

David Widdowson discusses strategies for improving customs risk management and compliance through an integrated approach. It highlights the need for customs administrations to balance enforcement with trade facilitation, focusing on a risk-based approach to optimize resource use. Widdowson emphasizes the importance of collaboration between customs authorities and the business community, leveraging technology, data analytics, and international cooperation to improve compliance while minimizing trade disruption (Widdowson, 2020).

### **John Boyd's OODA loop and the possibility of its implementation in risk management**

Various theoretical data analysis systems involve digital databases, such as Boyd OODA (Observe, Orient, Decide, Act) loop. This system, created by military pilot Col. John Boyd, was initially intended to assist military aircraft pilots in analyzing and making quick decisions in extreme conditions. Although the OODA system was created to make fast decisions in aerial combat, it is also used in other spheres.

The OODA loop methodology, developed by John Boyd, has advantages and disadvantages. The benefits of the OODA loop are that it is very versatile, flexible, and adaptable.

The OODA loop helps you quickly adapt to changing conditions, is instrumental when the environment changes rapidly and requires a quick response. Improving the efficiency of decision-making, a systematic approach to observation, orientation, decision-making, and action helps to improve the quality of decisions by avoiding impulsive and rash steps. Close observation and guidance based on current information allow researchers to understand the situation better and make more informed decisions. The versatility of the OODA loop is based on the fact that it can be applied in various fields, from military operations to business and crisis management in the public sector, like customs service. Implementing an OODA loop requires discipline and skill, especially in the orientation phase, where complex information must be interpreted correctly, requiring high skills for Customs Service workers. There is also a risk of information overload in the observation and orientation phase, where a large amount of data can make the decision-making process more manageable. A constant focus on observation and Analysis can lead to “analysis paralysis when excessive Analysis and doubt prevent an organization from making timely decisions and actions. The effectiveness of an OODA loop is highly dependent on the quality and timeliness of the information received; decisions can be flawed if the data is incorrect or outdated (Boyd, 2018)

Also, LOOP can be integrated with Adaptive Learning Platforms, which represent platforms that use artificial intelligence to analyze the interaction of platform users with each other, third parties, or the operational environment itself. These systems include Smart Sparrow, Knewton, and Dreambox, often used to adapt educational material in real-time.

This brings up issues such as the ethical issue of automating decision-making. It can lead to discrimination or incorrect decisions due to erroneous data. In the same case, using the OODA loop in trade can lead to a significant advantage for a country, creating a situation of unfair competition.

The OODA loop can be effectively used in risk management, especially where risks are subject to rapid change, such as in the Customs sphere. Boyd's OODA loop can be effectively used in case of the emergence of new risks due to new commitments and trade pacts, economic embargoes, high risk of smuggling, etc.

### **Pre-Pol risk management**

Another method of risk management created for the police has also been very effective in other systems. It can also be used within the Customs Service.

For example, the Qlik Sense surveillance system, similar to Pred-Pol, a data-driven predictive surveillance system, and its reliance on data for various organizations, including healthcare and police, were being studied. Using it and creating a network with similar systems increases its efficiency significantly (Pearson et al., 2024).

Qlik Sense is more comprehensive than other systems implemented in the presentation of UK police forces. It is fully operational with multiple applications using predictive analytics covering both geographies and individualized types of predictive policing (Couchman, 2019).

At the same time, there is an ethical problem related to data protection. Given that Qlik Sense uses massive commercial data, weak database protection can compromise it. In the event of erroneous data, incorrect decisions can occur, which can have serious consequences. In the hands of governments or other influential organizations, analytical platforms such as Qlik Sense can manipulate public opinion or create distorted reports in favor of specific interests.

PredPol (Predictive Policing) is a predictive policing system that uses algorithms to predict the likelihood of crimes occurring in certain areas and at certain times. Based on historical crime data, the system identifies hot spots where future crimes may occur and dispatches police patrols there.

The system helps rationally allocate resources, directing them where they are most needed and maximizing optimization. Pred-Pol provides data for long-term planning and decision-making based on trend analysis. It accelerates the processing of large volumes of data and makes it more accessible for real-time use by analyzing historical data.

Customs authorities can use the system to analyze historical data on seizures, smuggling incidents, trade violations, and other risk indicators. The system can then predict the locations and times when these risks are most likely to occur. The availability of risk tools in pretrial release decision-making appears to be widespread (Sabot et al., 2022).

By analyzing patterns such as the most smuggled good types, the highest-risk countries of origin, and seasonal trends, customs can better allocate resources to high-risk areas.

Customs officers can be strategically deployed based on system-predicted risk levels. For example, suppose the system predicts a high probability of smuggling in specific shipments or at certain border crossing points. In that case, customs can allocate more personnel or inspection resources to those areas. This can improve the effectiveness of border controls without overwhelming resources, as it helps to focus inspections on higher-risk targets.

Instead of random inspections, customs authorities can use the Pred-Pol system to identify high-risk shipments, vehicles, or individuals for a more thorough inspection. This targeted approach can reduce the time and costs associated with random inspections while improving the detection of illegal goods or other risks.

The system can track and flag unusual trading patterns or behavior that may indicate emerging risks. For example, suppose there is a sudden increase in shipments from a region known to produce counterfeit goods. In that case, the system can alert customs officers to increase vigilance in monitoring shipments from that area. Similarly, the system can detect changes in smuggling methods or routes and suggest adjustments to inspection procedures.

The Pred-Pol system could be integrated into customs risk profiling, where specific shipments, containers, or people are flagged for potential risk based on their characteristics or patterns that match previous violations. By predicting high-risk profiles, customs authorities can focus their attention on these profiles, leading to more efficient and accurate risk management.

Customs services often need to coordinate with other agencies (national and international) for effective border management. Using a predictive system, customs authorities can share risk data with neighboring countries to create a more unified approach to cross-border threats, such as smuggling networks that operate across multiple borders.

As new data is continuously fed into the system, PredPol can dynamically adjust risk assessments. This means that customs authorities can respond in real time to changes in risk levels, such as adjusting inspections if the system detects an increase in illegal activities or identifying new smuggling routes.

## Conclusion

In conclusion, using advanced data analysis technologies, such as big data Neuro-learning and adaptive learning platforms, represents a significant opportunity for Customs Services around the globe. These tools enable more effective risk management, improving the security and facilitation of international trade. Predictive analytics methods and distributed systems, such as PredPol, Qlick Sense, and the OODA loop, provide a forward-looking system for risk anticipation and prevention, quickly adapting to changes in the international trade environment.

At the same time, big data technologies can help improve smuggling detection and optimize resources by focusing on high-risk areas. The rapid data exchange between customs services in different countries has become essential in an increasingly interconnected and digitized world. This collaboration can contribute to a unified and practical approach to cross-border threats, strengthening security and facilitating trade flow.

Using data systems based on AI and big data can lead to ethical and decision-making problems, such as erroneous data, incorrect decisions, information leaks, manipulation, or discrimination.

Finally, integrating these technologies in customs risk management, especially in developing countries such as the Republic of Moldova, can substantially improve the activity's efficiency and reduce risks within the Customs Service's operations.

## Declarație de interes

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