Sustainable Digital Evolution: Transforming the Ukrainian Customs Service

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ABSTRACT:

The evolving landscape of information technologies has spurred a profound digital revolution across cultural, societal, organizational, and governmental domains. This article examines the transformative impact of Information and Communications Technology (ICT) and electronic systems within Ukrainian customs operations and their broader societal implications. At the core of this exploration lies the pivotal role of ICT integration in modernizing the Ukrainian Customs Service amidst global challenges, exemplified by the COVID-19 pandemic. The study assesses the benefits, challenges, and implications of "electronic customs" and IT-driven reforms, focusing on the three pillars of sustainability, customs operations, and digital culture. Objectives encompass an evaluation of ICT's significance in enhancing border management efficiency, addressing challenges, and leveraging opportunities through technology-driven customs initiatives. Synthesizing academic publications and governmental reports, the article provides comprehensive insights into the transformative potential of technology in customs management. Notably, the implementation of anti-corruption measures, particularly through the Single Window system, emerges as a successful endeavor in curbing malpractices while streamlining customs procedures. However, challenges persist, including swift adoption, cyber fraud risks, and systemic issues within customs authorities, necessitating phased implementation and continuous improvement. Ethical reflections on technology integration into governance mechanisms, educational reforms, and inclusivity discussions underscore the broader societal and philosophical shifts catalyzed by electronic customs. This sustainable digital evolution emphasizes ongoing ethical considerations to navigate the evolving role of technology in shaping governance, societal integration, sustainable customs operations, and the inherent alignment of digital technologies with the key objectives of sustainable development.

Keywords: customs operations, digital culture, sustainable development, Single Window, cybersecurity, Information and Communication Technology, societal impact, ethical framework, cultural shifts

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1. Introduction

The rapid evolution of contemporary information technologies and the widespread digitization across societal, organizational, and governmental spheres signify a significant shift towards electronic paradigms. It is essential to recognize the nuanced nature of insights drawn from diverse scholarly works, as each source may inherently contain limitations and potential biases. Cooper and Zmud (1990) articulated the essence of information technology (IT) implementation as a holistic integration into organizational practices, disseminating suitable information technology among a user community, reflecting the holistic integration of technology into organizational practices. While their findings, based on empirical data from a random sample of manufacturing firms in the United States, offer valuable perspectives on IT implementation, the industry-specific context may limit direct extrapolation to the customs domain. Bernaziuk (2017) notes the general regulatory role of information and digital technologies in shaping information flows within administrative bodies, impacting decision-making processes and administrative effectiveness. Concepts like e-government, e-governance, and e-state in public administration symbolize this digital transformation (Luna-Reyes, L. F. & Gil-Garcia, J. R., 2014), which not only redefines administrative processes but also influences educational structures, social interactions, and cultural values. This theory, while insightful, relies on system dynamics and institutional approaches, which may introduce theoretical biases. Khrypko, et al. (2021) highlight information technology's catalytic role in reshaping legal, moral, and cultural relations within countries, impacting ethical and moral frameworks and reshaping cultural norms. Acknowledging the potential influence of cultural and contextual factors is crucial for understanding the broader implications in diverse administrative settings.

The influences of globalization, integration processes, and digitalization extend to payment systems. Ukrainian economists, as highlighted by Sytnyk et al. (2022), assert the imperative for Ukraine to boost the efficiency of its payment system by harmonizing with European standards and regulations within the realm of digital transformation. It is important to note that the study primarily focuses on the development of payment systems, and its direct applicability to customs operations may require careful consideration of contextual disparities. Within the customs domain, e-governance takes precedence due to its pivotal role in the modern national economy. Ukraine's unwavering commitment to international integration, evident through its global agreements and memberships, underscores its reliance on cutting-edge information sector advancements for customs development. However, a nuanced approach is necessary, as the sources provide specific insights that may not perfectly align with every aspect of Ukrainian customs operations. The COVID-19 pandemic spotlighted the crucial role of Information and Communications Technology (ICT) worldwide (Sardar et al., 2021), emphasizing its significance in enabling customs administrations to combat challenges posed by the pandemic. ICT played a vital role in ensuring supply chain security and facilitating compliance with essential protocols, such as social distancing and trade facilitation. Notably, the pandemic triggered significant macroeconomic digital transformations (Stoianenko et al., 2022).

Many scholars emphasize the imperative for customs administrations (Dalton & Stosic, 2021) to adopt new ICT as part of their modernization strategy. This approach explores the impact of digitalization on customs transit performances and the enforcement of trading policy. The empirical research in the Serbian context, as presented by Dalton & Stosic, provides valuable insights, but the generalization to other customs administrations (in Ukraine, for instance) necessitates consideration of contextual variations.

Connecting these advancements with sustainability goals, the integration of ICT in customs operations has the potential to enhance efficiency, reduce resource consumption, and contribute to a more sustainable and environmentally conscious customs management system. However, it is crucial to acknowledge that each source brings a unique perspective shaped by its context and objectives, and a nuanced interpretation is essential to navigate potential limitations and biases.

While acknowledging ICT's constant evolution (Perez Azcarraga, 2022), it is essential for customs administrations to seize reform and modernization opportunities beyond procedural boundaries, incorporating decision support for organizational functions like resource planning, risk management, and performance measurement. Scholars note that the digitalization of the national customs system must be aligned with risk management guidelines (Kim, 2020) to navigate the complex landscape of contemporary risks associated with cyber threats and global security challenges. It is imperative though to exercise caution in directly applying each case of the proposed ICT implementation stage model (like from the case study of the Korea Customs Service) to the Ukrainian context because each country's unique circumstances may introduce variations that necessitate careful consideration.

Transitioning from the 20th to the 21st century, ICT adoption in customs evolved globally. Initial digitization efforts led to disparate, unconnected systems. However, gradual progress led to integrated electronic data exchange, improving operations such as cargo tracking and fostering interoperability among customs and national agencies.

As the Customs Service advances its comprehensive IT integration to modernize operational procedures (Ivashova & Kiida, 2019), cybersecurity is a fundamental aspect receiving heightened attention. These initiatives, which encompass the establishment of a "Single Window" system, improved customs control, and harmonization with EU standards, place paramount importance on ensuring efficiency, transparency, and security in cross-border operations. In light of discussions regarding national security, recent analyses by Kryvyzyuk et al. (2021) underscore the multi-dimensional nature of security, particularly in postmodern societies. They emphasize the evolving paradigms of security within societies, shedding light on the intricate relationship between national interests, values, and the ever-evolving cybersecurity landscape.

This article aims to comprehensively explore the transformative impact of ICT and electronic systems in Ukrainian customs operations. It intends to delve deeply into the benefits, challenges, and implications of implementing "electronic customs" and IT-driven reforms, aligning these insights with global technological advancements and evolving customs practices. The research also considers the broader societal implications, including educational transformations and cultural shifts, brought about by ICT integration in customs operations.

To reach this aim, we have set the following objectives: to assess the transformative impact of ICT integration within Ukrainian customs operations, emphasizing its role in modernizing the Ukrainian Customs Service and enhancing border management efficiency amidst global challenges like the COVID-19 pandemic; and to investigate the challenges, opportunities, and implications linked to the phased implementation of "electronic customs" and IT-driven reforms in Ukraine. This investigation aims to comprehend systemic changes, benefits, limitations, and their impact on cross-border trade, international standards adherence, and security measures.

These objectives seek to evaluate the significance of ICT integration within customs, focusing on its transformative effect on modernizing Ukrainian customs operations and addressing challenges while leveraging opportunities through the adoption of "electronic customs" initiatives.

2. Methodology

This article employs a multifaceted research methodology to comprehensively explore the impact of ICT integration in customs, both globally and within Ukraine. It is founded on a rigorous review and analysis of existing literature, academic publications, and governmental reports that elucidate the landscape of ICT integration in customs operations. Through this analysis, the study encompasses global trends and specific initiatives, offering insights into the transformative potential of technology in customs management.

The synthesis of these approaches ensures a holistic and nuanced understanding of the subject matter, enabling a comprehensive exploration of the transformative implications of ICT integration in customs operations, with a specific focus on the Ukrainian landscape.

3. Results

The implementation of anti-corruption measures within customs, primarily through the Single Window system (Ministry of Finance, 2023), stands as a lengthy yet successful endeavour. This mechanism significantly curtails human intervention during customs procedures, effectively mitigating the potential for corrupt practices. The Ministry of Finance's active engagement in disseminating comprehensive system implementation details has facilitated inquiries and provided essential clarifications. Continuous communication and dialogue are believed to be pivotal in further reinforcing these ongoing changes, aligning with the goals of transparency and efficiency set by ICT-driven reforms.

The benefits of the Single Window system manifest clearly in its operational advantages. The concurrent inspection of goods by all regulatory authorities streamlines processes, minimizing redundancy, and augmenting efficiency. This consolidated approach markedly expedites operations, fostering a more efficient customs environment. Simplification and acceleration of customs formalities, predictability and clarity of procedures are crucial (Lemekha, 2020).

Moreover, the Single Window system contributes significantly to cost reduction for businesses by minimizing interactions between businesses and regulatory agencies

during the control process. This reduction in interactions streamlines procedures, potentially mitigating delays and enhancing overall operational efficiency, a crucial aspect in adhering to international trade standards.

Notably, regulatory authorities operate within a stringent four-hour window to decide on appropriate control types. Failure to reach a decision within this period, upon receipt of electronic messages and scanned documents, triggers the system to consider state control procedures as completed. This streamlined decision-making process forms the foundation for concluding customs control and clearance for goods traversing Ukraine's customs borders, aligning with the objectives of efficient border management set by ICT integration.
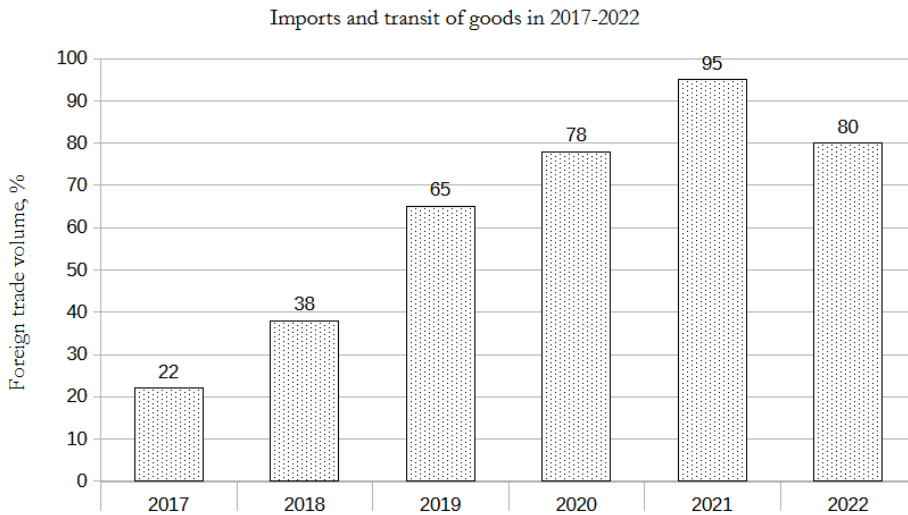

Figure 1: Foreign trade transactions processed through Single Window in Ukraine.
Source: Data of Ministry of Finance of Ukraine, Authors own elaboration.

Reduction in goods imported or transited using the "single window" mechanism can be due to the significant impact of factors related to the military invasion by the Russian Federation into the territory of Ukraine on 24 February 2022, the introduction of martial law in Ukraine, the downtime of some customs offices, closure of many checkpoints and reorientation of trade flows.
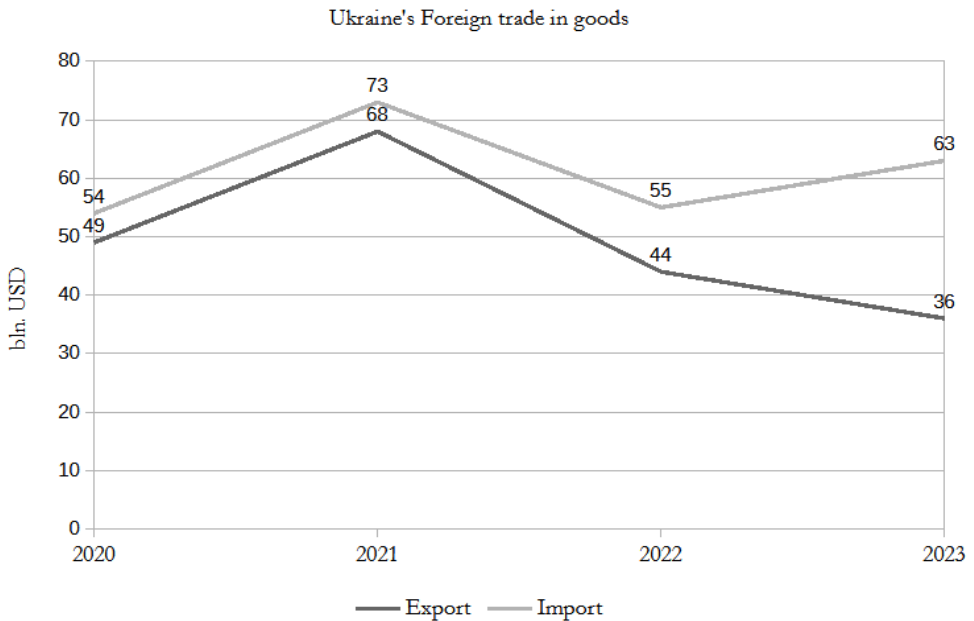
Figure 2: Foreign trade in goods in Ukraine for 2020-2023, USD bln.
Source: State Statistic Service of Ukraine, State Customs Service of Ukraine, Authors own elaboration.

Although the foreign trade in goods in 2023 showed some signs of stabilization, challenges arose from the destruction of port infrastructure and the blockage of grain exports. The trade balance worsened due to sustained import growth and a continuous decline in exports, resulting in a negative balance reaching nearly 27 billion US dollars. Exports to the EU decreased by 15% due to transit issues and import bans on grains and oilseeds by certain EU member states. Yet, the evidence of growing imports underscores the tangible benefits of the Single Window system and its substantial contribution to combating corruption, enhancing efficiency, reducing costs for businesses, and streamlining decision-making processes, ultimately bolstering effective border management practices.

4. Discussion

Customs authorities confront challenges in overseeing cross-border transactions due to resource constraints, necessitating innovative approaches, notably in risk management. This imperative arises from the need to strike a balance between facilitating trade and ensuring stringent control, a crucial consideration amid the escalating volume of international trade activities (Van Trang et al., 2023).

Efficiency in border management depends on universal recognition and acknowledgment among stakeholders, from leadership to grassroots contributors. Modern technologies, managing information effectively, reshape global economic dynamics, especially in customs and logistics. The introduction of electronic systems, such as

"Electronic Customs", simplifies international trade procedures and fortifies security measures.

Globally, leading customs services, like those in Japan, the United States, Germany, France, Russia, China, and Canada, leverage modern information technologies to drive their operations. For example, Korean studies examining the impact of Robotics Process Automation (RPA) technology on international import and export customs procedures demonstrate positive outcomes, such as enhanced work efficiency and processing speed. However, these studies also address potential drawbacks, citing issues related to optical character recognition (OCR) and the associated high initial development and operating costs (Lee, 2023). Ukraine, actively aligning with European integration, embraces concepts like "Electronic Customs", evident through its accession to international conventions and approval of the "Electronic Customs" system by the Cabinet of Ministers (Shtal, 2016).

The global trend towards e-customs is evident in various countries, showcasing the transformative impact of modern technology on customs operations. In Brazil, the implementation of AI in Customs is exemplified by the SISAM (Selection System for Customs via Automated Learning), an AI system operational since 2014 (Collosa, 2020). SISAM analyses import declaration forms, employing machine learning to estimate the probability of errors and calculate expected values. Moreover, Brazil utilizes AI for fraud detection in foreign trade since 2016, offering an efficient means of identifying potential suspicious transactions and detecting outliers in large-scale operations (Juarez, 2018).

On the other hand, Argentina emphasizes data mining for early detection of suspicious operations, demonstrating a commitment to intelligent information use for preventive measures. The digitization of Argentine Customs encompasses modernizing controls, establishing a Single Window for Foreign Trade (VUCEA), and implementing facial recognition systems at airports (Collosa, 2020). Notably, the facial recognition systems are widespread globally, with examples like Tocumen in Panama, Canadian international airports, and the United States' Department of Borders and Customs (CBP), showcasing the increasing use of AI for identity verification and border control.

Furthermore, examples from Portugal, Chile, and Australia highlight innovative projects like the 'E-Taxfree Portugal' under the Simplex project, dematerializing VAT refunds, and Chile's AduanaCl mobile application facilitating online customs procedures. These instances underscore the international embrace of digital solutions to enhance efficiency, transparency, and security in customs operations. The global trend of e-customs and the pervasive influence of ICT on customs operations are underscored by the policies and recommendations of international organizations such as the World Bank, the World Customs Organization (WCO), the World Trade Organization (WTO), and the European Union, reinforcing the universal recognition of the transformative impact of technology in shaping customs practices worldwide (Lewis, 2009). The global landscape demonstrates a shared commitment to leveraging technology, particularly AI, for comprehensive advancements in customs management, emphasizing the need for continuous innovation and adaptation to modern digital paradigms.

In Ukraine, the "Electronic Customs" system, integrated into the State Customs Service's Unified Automated Information System (UAIS), ensures seamless information flow and automates customs procedures (State Fiscal Service, 2018). This multifaceted

system fosters security and economic stability by facilitating information exchange among entities, authorities, and customs administrations. Key modules, like the Automated Risk Analysis and Management System, employ innovative approaches, such as fuzzy logic algorithms, utilizing historical data to create comprehensive risk profiles for customs clearances. It is possible to claim the formation of a new cyber-physical system that optimizes integrated digital systems (Nazarko & Fedotov, 2023).

Over 95% of customs declarations in Ukraine currently operate electronically, guided by principles ensuring legality, data integrity, unified formats, standardized documents, and multi-level information access. These digital shifts streamline operations while upholding security standards, reflecting a broader integration of digital technologies within cultural and economic domains. Moreover, this extensive digitalization has significantly contributed to the reduction or mitigation of shadow economy cases, given the enhanced transparency and traceability enabled by electronic customs operations (Ishchuk, 2023). The enforcement of standardized procedures and data integrity via digital platforms plays a pivotal role in combatting illicit practices and fortifying the economy against shadow transactions.

While "electronic customs" brings transformative benefits like streamlined controls, stringent oversight, and remote clearance convenience, it also poses challenges. Swift adoption may cause operational chaos, necessitating a gradual shift to mitigate disruptions. Risks of cyber fraud, poor internet connectivity, and the need to enhance computer skills for customs operations staff loom. Cybercrime is called one of the most important issues, specifically in the context of hybrid wars (Matveev et al., 2021). Additionally, the risks associated with the digital economy include technological risks arising from imbalanced development across sectors and social risks linked to job market transformations, job reduction for certain skill levels, increased unemployment among older individuals due to automation, and changes in management processes (Chaliuk et al., 2021). Navigating these challenges is crucial for a smooth, sustainable implementation.

Implementing e-customs in Ukraine promises significant strides in foreign economic relations. However, persistent challenges are linked to unresolved systemic issues within customs authorities. Enhancing functionality demands phased implementation, substantial resources, and a continuous improvement mindset.

The implementation of the Single Window system in customs operations has encountered several challenges and criticisms. Infrastructure limitations, such as the lack of a suitable material and technical base meeting customs authority standards, and the presence of temporary facilities at half of the border crossing points, pose significant hurdles. Inexperienced customs officers responsible for implementing the Single Window principle add operational challenges. The absence of a unified information system for foreign trade complicates customs procedures, and imperfect legal regulation further hampers the system's effectiveness. Additional state controls, including sanitary, veterinary, phytosanitary, environmental, and radiological controls, complicate the integration into the Single Window system, necessitating extra customs procedures (Vasylenko, 2015). Challenges also arise from electronic information acceptance, where controlling authorities face difficulties in processing electronic data due to unclear legal status and outdated submission procedures.

However, it is crucial to emphasize that despite these challenges, the positive aspects of the Single Window system and electronic customs outweigh the drawbacks. Measures such as anti-corruption initiatives and efficiency gains contribute significantly to the overall success and effectiveness of the system. While initial concerns prompted refinements and adjustments, the subsequent revisions indicate a commitment to overcoming challenges and enhancing the system's functionality for improved customs operations.

In essence, the introduction of electronic customs streamlines the workflow, empowers customs officers, and enables efficient handling of increased workloads. While demanding significant investments, this advancement underscores the necessity of continuous improvement within the customs service.

The evolution from traditional customs to electronic paradigms signifies a societal shift in trust and reliance on technological interfaces. It's an educational journey, both for customs officials and citizens, urging adaptation and skill acquisition in a digitally driven environment. The ongoing transformation prompts educational institutions to incorporate digital literacy and customs-related technological training into curricula, preparing future professionals for evolving administrative landscapes.

Philosophically, this shift raises discussions about the nature of governance and the interface between citizens and institutions. It prompts contemplation on the ethical implications of integrating technology into governance mechanisms, urging reflections on privacy, data security, and the potential marginalization of segments less adept in navigating digital domains.

The societal integration of electronic customs also emphasizes inclusivity and equitable access to technological advancements, emphasizing the democratization of technology across all segments of society. Moreover, it extends to the evolving role of customs, influencing societal perceptions of transparency, fairness, and integrity. Electronic customs adoption fosters an environment of accountability, reinforcing public trust in administrative bodies. Moreover, the era of digital transformation presents a myriad of opportunities, encompassing the incorporation of advanced technologies such as data analysis, immersive technologies, blockchain, innovative approaches for acquiring customs information, and the integration of artificial intelligence within customs control processes (Vovchenko et al., 2022).

The incorporation of electronic customs necessitates societal and philosophical shifts, entailing educational reforms, ethical considerations, and inclusivity discussions. It stands as a testament to the interconnectedness of technology, governance, education, and societal dynamics.

5. Conclusions

The shift towards electronic customs, as discussed, aligns with broader literature emphasizing a profound societal trust in technology, reshaping governance, education, and cultural norms. Embracing e-governance as a linchpin in modern economies, this evolution prompts ethical considerations, emphasizing inclusivity and transparency. Strategic digital investment is crucial for enhancing efficiency and competitiveness in

international trade and customs, offering valuable insights for policymakers and stakeholders (Jaloliddin, 2023).

Challenges persist, requiring a gradual transition to electronic systems amidst risks like cyber fraud and connectivity issues. Successful implementation demands continuous improvement within customs services and educational reforms preparing future professionals for this digital era. In an effort to modernize how customs operate, Ukraine's State Customs Service is teaming up with the Ministry of Digital Transformation to bring the "Digital Transformation of Customs (e-Customs)" project to life. This exciting endeavour has big plans to transform various aspects of customs procedures by introducing a cutting-edge information system. We consider it a major upgrade, including automating customs processes, introducing electronic customs clearance services, and simplifying customs control procedures. But it is also important to note that they are not just about technology; they are also laser-focused on keeping things secure. Addressing cybersecurity is a top priority, ensuring that sensitive information stays safe. They are using tactics like secure software development tools, a centralized anti-virus protection policy, a unified authentication system, and clever mechanisms to prevent leaks. It is not just an upgrade; it is a smart and secure way to bring customs into the digital age. Furthermore, the project entails setting up a centralized event and incident monitoring centre for real-time analysis of security events. These comprehensive cybersecurity measures highlight a steadfast commitment to ensuring the integrity and security of electronic customs operations in Ukraine.

This journey intertwines technology, governance, and societal norms, underscoring the need for ongoing ethical reflections and inclusivity discussions. Further studies could delve into the long-term societal impacts and the evolving role of technology in shaping governance while addressing digital divides for comprehensive societal integration.

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