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Modern Customs Systems as a Pillar of International Trade in the Era of Digital Transformation: The Algerian Customs Electronic System (ALCES) as a Model

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Abstract:

This study aims to demonstrate the importance of modern customs systems as a cornerstone of international trade in the digital age, using the Algerian Customs Electronic System (ALCES) as a case study.

The study concluded that the implementation of the ALCES system led to improved efficiency and transparency in customs administration, enhanced revenue collection, and facilitated international trade.

Keywords: Customs; International Trade; Digital Transformation; ALCES; Algeria

Jel Classification Codes: F13 ; O33 ; F10

1. INTRODUCTION

The digitalization of public sectors is a primary objective of the Algerian state, aimed at implementing a new strategic vision based on modern governance frameworks. These frameworks are intended to guarantee transparency in administrative transactions and to provide high-quality public services that fulfill the expectations of both citizens and economic stakeholders. Concurrently, they facilitate the production of precise data and dependable indicators essential for attaining scientifically grounded sustainable development.

In this context, digitalization has become an essential requirement for effectively navigating the strategic transitions occurring in Algeria, especially within the scope of the present economic recovery program. This program now focuses on mobilizing all national resources to execute the 2020–2030 international trade policy vision. The economic comeback of Algeria necessitates ongoing efforts and the enhancement of its national economic trajectory through supplementary measures that fortify previously attained achievements.

The Algerian Customs administration exemplifies a leading industry that has adopted digital transformation via the implementation of its new electronic system ALCES. This system serves as an efficient tool for shifting from conventional administrative management techniques to a contemporary digital service model designed to facilitate, expedite, and streamline customs operations for the advantage of diverse economic operators.

The reason for the interest in the customs sector is that it plays a fundamental role in organizing and monitoring international trade and protecting the national economy across borders, through the collection of duties and taxes. Customs collect customs duties and import and export taxes, which are an important financial source for the state treasury. Additionally, customs monitor and secure the borders, overseeing the flow of goods and people to prevent smuggling and the entry of illegal or dangerous goods. Its role is also evident in protecting the national economy by supporting local products in the face of unfair competition and implementing the state's trade and protectionist policies. Its role does not

stop there; it extends to protecting consumers and public health, as customs ensure that imported goods comply with quality, safety, and public health standards, and prevent the entry of counterfeit products. Moreover, it works on facilitating foreign trade by simplifying customs procedures and accelerating the flow of legitimate goods to encourage exports and ease the movement of commercial exchanges.

Study problem:

The research problematic of this study centers on the role of the Algerian customs electronic system ALCES, as a strategic option for international trade in the era of digital transformation and the extent to which it contributes to the digitalization and modernization of the Algerian customs system.

And from that branch a set of questions as follows:
-What are the main components of the ALCES system?
-What are the achievements that have been accomplished after implementing the system?
-What are the challenges facing the implementation of the system?

Study hypotheses:

The study is founded on a primary hypothesis asserting that the ALCES system constitutes a strategic option for the digitalization of the Algerian customs administration. The digitalization of customs systems serves as an effective mechanism for improving the efficiency of international trade by expediting procedures, lowering transaction costs, and increasing the flexibility of economic activities.

The sub-hypotheses can be formulated as follows:
-H1: The implementation of the ALCES system leads to a reduction in customs clearance time.
-H2: The implementation of the ALCES system leads to an increase in customs revenues.
-H3: The implementation of the ALCES system leads to enhanced transparency and reduced corruption.

Significance of the Study:

The importance of the research is represented in the following points:

-Theoretical significance: Enriching the literature on customs digitisation.

-Practical significance: Guiding decision-makers in Algeria.

-Beneficiary categories: customs, economic operators, researchers.

Objectives of the Study:

The study aims to achieve the following objectives:

-Analysis of the role of modern customs systems in international trade.

-Evaluation of the ALCES system experience in Algeria.

-Identifying challenges and proposing recommendations.

Methodology:

This research employs a descriptive methodology to describe the justification and prerequisites for the transition to a contemporary customs system in the context of digital transformation while also delineating the overarching framework of the ALCES system. An analytical technique is used to evaluate the accomplishments attained during the installation of this system via numerous performance indicators, as well as to discern its principal obstacles. In this context, document analysis and statistical tables serve as principal research instruments.

Study Limitations:

-Temporal scope: The period 2019–2024.

-Spatial scope: Algeria only.

-Methodological scope: Reliance on secondary data.

Previous studies:

-Study by **RABHI, F., & El Hadj Ali , B.** (2023, 11 30). The new information system as a mechanism for digitizing customs procedures in Algeria. Journal of Legal and Political Thought, 7(2), 323-347:

The study aims to address the issue of the impact that the activation of the new information system will have on the pace of customs procedures by highlighting the role that digitisation of customs procedures plays in improving customs performance, the impact of information and communication technology on customs procedures, in addition to analysing and evaluating the current situation of information system usage and the qualitative addition that the new information system will provide to

customs and economic operators, as well as the obstacles that may face its implementation.

The study concluded that customs procedures in Algeria will from now on take on a completely new dimension, as the new information system will introduce modern control procedures, customs control based on a risk management system, and the formation of procedures for remote movement of goods across customs borders, simplifying customs procedures, and thus digitising customs organization and all its activities.

-Study by **FERRAH, F**. (2021, 10). Digitization of the Algerian Customs Administration and the imperative of moving from SIGAD to E- Customs. Journal of El-Manhel Economy, 4(2), 189-196:

The study aims to address the issue of the deficiencies that the SIGAD system suffered from, which forced the Customs Administration to move towards a new information system based on digitisation, by attempting to evaluate the SIGAD system by identifying its shortcomings, and trying to shed light on what the new information system will offer to the Algerian Customs Administration.

The study concluded that the SIGAD system only partially supports customs activities, as the new system, as its replacement, will contribute to reducing the customs clearance time, thereby lowering logistical costs with the aim of facilitating trade exchanges and providing greater transparency to customs activities. Additionally, it will ease the movement of people and goods without obstacles, which will only be achieved through the concerted efforts of all customs departments.

-Study by **Belamri, Y. C., & Ziane, B**. (2025). Obstacles to the implementation of the South Korean electronic customs system UNI-PASS in Algeria: comparative study with Ghana. Algerian Journal of Human and Social Sciences, 13(2), 481-504:

This study aims to shed lights on the key challenges encountering the implementation of the South Korean electronic Customs system UNI-PASS in Algeria, following a comparative study with Ghana, based on secondary data.

Finding suggested that inadequate ICT infrastructure, the absence of robust legal framework and organizational challenges including delays are the key challenges that hinder the implementation of the electronic customs system ALCES (based on UNI-PASS system) in Algeria, thus addressing these challenges is pivotal to ensuring the successful implementation of the UNI-PASS system

Based on previous studies, our study stands out by addressing the research gap, as it differs from previous studies by reviewing the status of the Algerian customs system before and after the implementation of the Alces system, providing a quantitative analysis of the impact of ALCES on customs performance indicators, unlike these studies which were merely theoretical narratives.

2. General Framework for Algerian Customs Electronic System (ALCES)

2.1 An overview of the Algerian customs system digitization project

The digitization of customs administration is integral to the fundamental policy frameworks directing public sector modernization and administrative reform. It seeks to optimize customs operations and processes, bolster transparency, and promote international commerce in a way that enhances the business environment and encourages investment in Algeria.

The customs digitalization project includes several essential elements, particularly the creation of technological infrastructure via a data center, the modernization and expansion of telecommunications networks, and the enhancement of software systems within a new integrated information system that aligns with current advancements in information technology. (GENERAL DIRECTORATE OF ALGERIAN CUSTOMS, 2024, p. 16)

In late 1995, the Algerian customs administration began the digitization of its customs system by integrating technology approaches into customs clearing procedures and service provision. This initiative aimed to optimize and standardize customs procedures, decrease clearance time, and enhance international trade in accordance with the World Customs Organization's recommendations for member states to implement

information technology as outlined in Chapter 7 of the General Annex of the Revised Kyoto Convention. In this regard, the customs administration instituted an automated system for customs data processing two years subsequent to the foundation of the National Center for Informatics and Statistics (CNIS) in 1993. This system replaced a previous, severely restricted system created in the 1980s and was intended to include operations pertaining to international commerce. It facilitated the processing of several functional domains, including customs clearing processes, taxes, dispute resolution, and the supply of statistical data on Algeria's foreign commerce.

Similarly, the Automated System for the Processing of Customs Data (SIGAD)[*] was implemented to fulfill the demands and criteria of transparency in customs operations. It is intended to align with current legal, regulatory, and procedural frameworks, while harmonizing operational processes for enforcing laws and regulations among customs offices linked to the system. (GENERAL DIRECTORATE OF ALGERIAN CUSTOMS, n.y)

The principal benefits of the SIGAD system, in its first deployment phase, include a substantial decrease in the reliance on paper documentation within customs operations, thus diminishing the expenses related to the creation, transmission, and storage of customs papers. Furthermore, the system aids in diminishing direct encounters with customs officers, mitigating exposure to corruption risks, enhancing accountability, improving the efficacy of control measures, and bolstering anti-corruption initiatives. Furthermore, the system facilitates enhanced oversight of products' movement in both import and export operations from legal and physical standpoints, therefore augmenting their administration and regulation across borders. (BOUROUIS , 2023, pp. 50-51)

The SIGAD system, which has been in use since 1995, has been the subject of numerous criticisms that have facilitated the emergence of the

[*] **SIGAD**: Système d'Information et de Gestion Automatisée des Donnés

new information system ALCES. Despite these challenges, the system has made significant contributions. The primary constraints consist of: (FERRAH, 2021, p. 192)

-The risk of data loss is associated with the obsolescence of workstations and operational terminals, as well as the absence of comprehensive coverage of all professional activities and customs support functions;

-The sustainability and maintainability of advanced system components are jeopardized by the absence of coding, documentation, and annotation standards;

-The lack of functional documentation for the database, the absence of standardized naming conventions for its components, and the failure of the fundamental foundations of the source code to meet software engineering standards all contribute to difficulties in maintenance and development;

-The absence of automatic data validation mechanisms, as well as automated data filtering and selection capabilities and reporting tools;

-The system's incapacity to effectively address the changing needs of customs administration, particularly in terms of the high logistical costs associated with customs documentation preparation, the complexity of customs procedures, and the extended processing times of cargo.

2.2 An introduction to the Algerian Customs Electronic System (ALCES)

Algeria is starting a new phase with the formal introduction of the ALCES customs system, an electronic customs declaration platform resulting from a strategic collaboration between the Algerian authorities and the South Korean firm CUPIA. This program is part of an ambitious goal to modernize Algeria's customs system. The technology draws inspiration from the successful UNI-PASS electronic declaration system created by the Korea Customs Service. ALCES was developed through a three-phase process that spanned three years, starting in 2019 and concluding with its official debut. Every step was meticulously orchestrated to guarantee the system's resilience and its capacity to fulfill operational demands.

The collaboration with **CUPIA**[*], a globally acknowledged South Korean firm renowned for its proficiency in customs solutions, was important in the design and execution of the ALCES system. This partnership facilitated the integration of global best practices into the unique Algerian setting, ensuring that the ALCES system not only meets local needs but also aligns with international standards for customs efficiency. The choice to link ALCES with the **UNI-PASS**[**] model demonstrates a dedication to enhancing customs operations by using an international standard. This strategy guarantees efficient adaptation to national requirements while enabling smooth incorporation into the Algerian customs framework, which is essential for improving trade facilitation and compliance with international standards. (Customs Uni-Pass International Agency CUPIA)

The Algerian Customs Electronic System is abbreviated as **ALCES**. It is a comprehensive electronic system that facilitates the automation of customs operations and is composed of numerous interconnected subsystems.

The new Algerian customs information system is defined as a system that relies on the use of information and communication technologies, focusing on the automated processing of customs data, as well as the implementation of automatic customs clearance procedures in Algeria through the use of various programs, such as electronic declaration, electronic statement, electronic invoice, electronic payment of dues, electronic certificate of origin, software for file selection and management, integrated management of risks, import and export companies, customs clearance, goods release, monitoring, and post-control, in addition to

[*] **CUPIA** : Customs Uni-Pass International Agency

[**] The Korea Customs Service has devised an advanced electronic customs clearance system known as **UNI-PASS**. It offers a unified, digital platform for international trade. This system integrates risk management functionalities and enables real-time shipment tracking, in addition to substantially expediting the customs clearance process (approximately 1.5 minutes for exports and 1.5 hours for imports).

automated management of passenger control and some new facilities for economic operators. (KARAMA, 2024, p. 3)

The development project of this new electronic system has involved the following key stages: the reengineering of procedures and processes to comply with the standards and benchmarks of the World Customs Organization, requirements analysis, conceptual and detailed system design, software development, testing, and implementation and deployment. (GENERAL DIRECTORATE OF ALGERIAN CUSTOMS, 2024, p. 16)

In 2018, the research and implementation project of the new information system was initiated under the supervision of teams that were primarily composed of Algerian experts. This project was conducted in collaboration with the Korea International Cooperation Agency (KOICA), which is recognized as one of the most prominent global models in this field. UNI-PASS, the Korean customs transit system, has been internationally acknowledged and extolled for its stability, efficiency, and functionality, particularly by the World Customs Organization. The initiative consisted of technology transfer, training, and maintenance components. The Republic of Korea granted the Algerian customs administration access to the source code of the information system, thereby approving this request. Additionally, the system is designed to create a unified platform for the exchange of computer data among foreign trade operators. (RABHI & El Hadj Ali , 2023, p. 334)

During the ceremony organized by Algerian Customs to commemorate its World Customs Day on January 26, 2023, the Prime Minister, Ayman Benabderrahmane, officially initiated the testing phase of the new information system. The system will be progressively implemented across all customs offices and centers following the conclusion of this three-month testing period. It was highlighted that the new system aims to create a completely digital and efficient customs administration that meets the needs of businesses and other involved parties by combining new technology with better performance standards. (Services du Premier Ministre, 2023)

2.3 Key features of the Algerian Customs Information System (ALCES)

The Algerian electronic customs system (ALCES) is characterized by its novel attributes and its customized alignment with the Algerian customs context. It is designed to function in a paperless setting, signifying a qualitative transformation in the digitization of customs processes. This strategy seeks to expedite processes, diminish bureaucratic procedures, and mitigate the risks of mistakes linked to the management of paper-based documentation.

The Algerian electronic customs system (ALCES) is an integrated platform that incorporates sophisticated technologies, including artificial intelligence and cloud computing, rather than being solely an automated system. The use of technology advances aims to improve operating efficiency and establish Algeria as a leader in contemporary customs procedures.

Facilitating access to the ALCES system for all stakeholders in the supply chain is a crucial aspect of its deployment. The Directorate General of Customs has started registration for the establishment of electronic accounts that provide access to the ALCES system. It has also prompted corporations, customs brokers, transport firms, and other economic operators to register using the designated website. A dedicated email address (alceshelpdesk@douane.gov.dz) has been created to support users during the registration process. This program demonstrates a dedication to providing competent assistance and resolving any challenges users may have. Upon completing registration, individuals have access to customs processes using the new system. (Customs Uni-Pass International Agency CUPIA)

2.4 Components of the Algerian Customs Electronic System (ALCES)

The new electronic system for Algerian customs consists of the following subsystems: (GENERAL DIRECTORATE OF ALGERIAN CUSTOMS, 2024, pp. 16-17)

-Digital Gateways of the Information System: To facilitate the dematerialization of customs processes, an internal electronic portal has been created for customs officers at all levels, in conjunction with an

external web-based site available to diverse professional stakeholders. The latter is designed for users of the customs administration, including economic operators, freight forwarders, carriers, declarants, operators of bonded warehouses and customs-controlled storage facilities, as well as banks and port authorities. All stakeholders may acquire user accounts by enrolling in the information system. Moreover, the electronic portal facilitates access to all interfaces of the new information system via a user account, allowing the execution of all customs operations and the delivery of notifications pertaining to the user's actions, eliminating the need for physical visits to customs offices.

-Cargo Tracking System: The updated information system has an electronic cargo tracking system that facilitates the monitoring of commodities from their arrival across land, sea, or air borders until the conclusion of customs clearance. This technology enables users to ascertain the location and legal status of items by inputting the shipment reference number or the container number for real-time tracking.

-Risk Management Framework: This approach facilitates the evaluation and appraisal of hazards linked to international trade activities. It seeks to improve control efficiency and security by allocating control resources and processes to activities and items that pose the greatest risk. Shipments are allocated to the appropriate control channel based on the risk assessment of commodities and economic operators. The system uses information about company records, the features of goods, where they come from, and the country of origin to prioritize inspections for items that need closer examination. This facilitates the prompt identification of unlawful activity while concurrently expediting processes and enhancing the movement of products.

-Electronic Customs Declaration System: This system allows importers, exporters, or their representatives (declarants) to make customs declarations and upload necessary documents, including invoices, certificates of origin, shipping papers, and relevant administrative authorizations, using computerized user interfaces. It enables economic operators to monitor the progress of filed declarations and get real-time information about modifications and supplementary requests relating to the clearing file.

Furthermore, the method diminishes the duration necessary to complete customs processes by obviating the need for in-person visits to customs offices.

-Electronic Clearance and Accounting Management System for Customs Cash Offices: This technology enables economic operators to online remit all customs duties and taxes using several payment options. Payments may be executed using electronic payment terminals located at all customs cash offices (81 offices) or through banking e-payment platforms utilizing bank cards or the "Edahabia" card. The procedure is executed safely, integrating several authentication and security protocols to safeguard users. The system facilitates the real-time electronic generation of all accounting records for customs cash offices, therefore conserving time and maximizing resource allocation.• Supervisory and Surveillance System This system guarantees database security and oversees the operational efficiency of applications and technical infrastructure, including communication networks. It identifies anomalous network activity, gathers and evaluates system logs, and conducts routine reviews of information system security.

3. Achievements and challenges of implementing the Algerian Customs Electronic System (ALCES)

3.1 Expected effects of implementing the Alces system as a model for digital transformation

Investigating the principal attributes of the ALCES system prompts critical inquiries about its influence on the Algerian customs framework and the advantages it offers to enterprises and stakeholders along the supply chain. We can encapsulate the aforementioned advantages as follows: (TRANSITAIRE Algérie, 2024)

-Minimization of customs clearance delays: The method markedly lowers customs clearance times, thereby affording companies more operational freedom in their business endeavors. This decrease is expected to enhance supply chain efficiency and expedite transactions.

-Augmentation of customs revenues: ALCES enhances customs revenue collection by automating operations and increasing control measures, which

allows for more accurate assessments of duties and taxes owed on imported goods. This anticipated rise in income is projected to bolster governmental financial resources.

-Promotion of global commerce: The technology streamlines customs processes, thereby enhancing international commerce for companies in Algeria. This facilitation may cultivate new trade alliances and enhance the nation's standing in the global economic framework.

-Augmentation of transparency and trust: The digitization of processes and the use of sophisticated technologies enhance the reduction of anomalies and the improvement of transparency in customs operations, which in turn can lead to more efficient trade practices and increased compliance with international standards. This increased transparency is anticipated to enhance trust among economic participants.

3.2 Current status of the ALCES System

Upon the Directorate General of Customs' completion of significant enhancements to the technological infrastructure, which encompassed the modernization of the fiber-optic communication network and the implementation of fixed and mobile stations utilizing the Algerian satellite (ALCOMSAT-1), the fundamental modules of the new electronic system (ALCES) were developed in alignment with the most advanced technologies available.

The new information system has been implemented universally throughout all customs offices and land, sea, and air border checkpoints nationwide. This technology facilitates the automated processing of customs clearance documentation for merchandise. In 2024, the number of comprehensive customs declarations exceeded 245.000, and more than 6.000 commercial operators registered in the ALCES system. Simultaneously, project teams began the construction of the system's second phase, focusing on modules pertaining to disputes management, investigations, post-clearance audits, and human resource management.

The Directorate General of Customs initiated the passenger processing system on November 1, 2024. This system facilitates the electronic and remote issue of transit papers for cars, declarations of cash and valuables, and all customs processes relevant to passengers, including vehicle

clearance .(GENERAL DIRECTORATE OF ALGERIAN CUSTOMS, 2024, p. 15)

In order to improve cooperation and create a single system, the project team is building a digital platform that will connect ALCES with the information systems of various ministries and government agencies that issue licenses and certificates needed for exporting and importing goods. Initial pilot testing began in July 2024, including administrative papers from the Ministry of Trade, the Ministry of Agriculture and Rural Development, and the Ministry of Industry and Pharmaceutical Production, with intentions for further extension to other administrations. This interconnectivity aims to create a cohesive digital ecosystem that enhances processes, elevates the quality of public services, and fosters the growth of the digital economy in Algeria. (GENERAL DIRECTORATE OF ALGERIAN CUSTOMS, 2024, p. 19)

To help customs officers and outside partners use the new information system effectively for customs clearance, many training sessions and workshops were held for customs brokers, freight forwarders, transport operators, and port institutions, since training is crucial for successful digital change. These projects sought to enhance the effective use of the system's features and functions. Moreover, educational guidelines were created for the same objective.

To facilitate the extensive implementation of the new information system in all customs offices and centers, customized training programs were executed to equip customs trainers assigned to 51 regional customs directorates. The trainers were assigned to provide training to both internal and external users at the regional level. Moreover, specialized technical training sessions were conducted for customs engineers, concentrating on programming tools, database administration, and cybersecurity, as part of a continuous effort to facilitate a seamless and safe digital transition. (GENERAL DIRECTORATE OF ALGERIAN CUSTOMS, 2024, pp. 16-17)

3.3 The state of the Algerian customs system before and after the implementation of the ALCES system

3.3.1 Transition from the old system (SIGAD) to the new system (ALCES)

Subsequent to the deployment of the ALCES system, its implementation is occurring incrementally over a specified timeframe, via a gradual transfer from the old SIGAD system to the new platform. This incremental strategy aims to reduce operational interruptions while facilitating seamless and effective system integration. The main goals of deploying ALCES are to decrease customs clearing durations, improve procedural efficiency, and augment revenue collection. (TRANSITAIRE Algérie, 2024)

3.3.2 The state of the customs system before the implementation of the ALCES system

The following elements can be used to summarize this:

-Although Algeria's ten main ports manage approximately 130 million tons of commodities annually and process imports exceeding USD 42 billion; (ALGERIA TECH, 2026)

- Customs clearance procedures in Algeria required an average of 9 to 14 days to complete import formalities. Customs clearance is a persistent obstacle for foreign companies that conduct business in Algeria, with delays that can last for several weeks or even months. This situation is primarily due to the intricacy of bureaucracy and the extensive documentation requirements, which create significant delays and complicate the import process for foreign companies; (International Trade Administration, 2023)

-According to development indicators compiled by the World Bank from officially recognized sources, the efficacy of the customs clearance procedure in Algeria was assessed at 2.3 (on a scale of 1 to 5) in 2022 with respect to the Logistics Performance Index (LPI) (Trading Economics, 2026). This score is indicative of a relatively less competitive trade environment, elevated transaction costs, and procedural inefficiencies.

3.3.3 The status of the customs system after the implementation of the ALCES system

The following important elements can be used to summarize this:

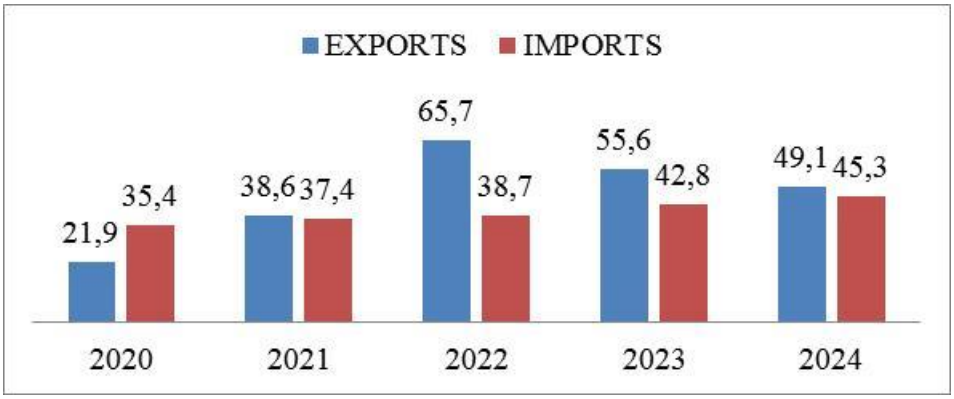
-Customs clearance time reduction: This is the primary objective of the system, as a substantial reduction in clearance delays has been achieved through the complete digitalization of the process (TRANSITAIRE Algérie, 2024). Additionally, the ALCES system's integration with the Port Community System (APCS) digital platform has expedited transaction processing and ensured that procedures are completed within a shorter timeframe than that of the previous period. (Algeria invest, 2024)

Empirical evidence suggests that customs release periods were exceedingly protracted at Algerian ports until early 2020, with an average of approximately 21 days. The average release time decreased to approximately three days in 2022, a significant development that was primarily attributed to the implementation of modernization and digitalization programs. However, it is important to recognize that the SIGAD system determines these clearance time estimates based on the registration of the customs declaration. Therefore, the customs release phase is only a portion of the total cargo transit time, as it does not consider the waiting period that occurs prior to the submittal of the customs declaration following the arrival of the products. (BOUROUIS , 2023, p. 56). In general, this indicates a considerable increase in efficiency, with an estimated decrease in processing time of more than 30% to 60%.

-Improving the volume and efficiency of international commerce processing: The estimated annual volume of products managed through Algerian ports is 130 million tons. (ALGERIA TECH, 2026). Figure (1) shows that the total exports in 2024 amounted to approximately 49 million dollars, a 55% increase from the previous year's exports of approximately 21.9 million dollars. In contrast, imports were estimated to be approximately 45.3 million dollars, which is a significant increase from 35.4 million dollars in 2021.These trends indicate that the incentive measures implemented by the customs administration, as well as the customs facilitation mechanisms granted to economic operators—particularly the reduction in the time required for customs clearance of exported goods—have proven to be relatively successful. Furthermore,

other institutions engaged in foreign trade have implemented complementary facilitation measures that reduced obstacles, accelerated commodity turnover, and substantially improved the overall efficiency of logistics.

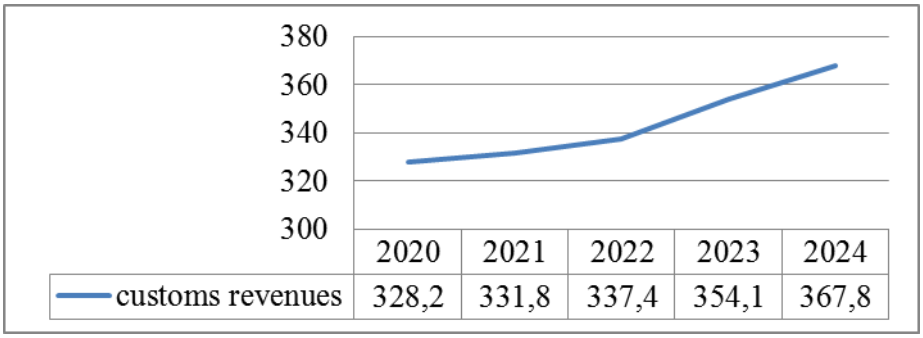
Fig.1. The evolution of the volume of exports and imports in Algeria during the period (2020-2024)
Unit: million dollars



source: Prepared by the researcher, based on: (Directorate General of Customs, 2024)

-Increase in Customs Revenues: Digital monitoring mechanisms and automation have improved the collection of customs revenue. Digital customs systems, such as UNI-PASS, typically result in revenue increases of 10% to 20% (TRANSITAIRE Algérie, 2024).as indicated by the international literature. Empirical evidence suggests that customs revenues, which include customs duties and equivalent charges, have increased from 328.2 billion dinars in 2020 to 367.8 billion dinars in 2024, a growth rate of approximately 12%. The accuracy of duty assessment and the robustness of transaction traceability have been improved as a result of the reduction of customs evasion and valuation errors, which are among the main factors contributing to this improvement. These developments are a positive indicator of the efficacy of digitalization, as they demonstrate an improved capacity of the customs administration in revenue mobilization, as well as enhanced operational efficiency and monitoring capabilities.
This improvement is achieved through the newly implemented system.

Fig.2. The evolution of customs revenues in Algeria during the period (2020-2024)
Unit: billion dinars



	2020	2021	2022	2023	2024
customs revenues	328,2	331,8	337,4	354,1	367,8

source: Prepared by the researcher, based on:
(Bank of Algeria, 2025, p. 125) (Bank of Algeria, 2023, p. 120)

-Decrease in logistics expenses: This is seen by the expedited vessel turnaround time and the diminished demurrage fees due to the integration of the ALCES system with port community platforms (Algeria invest, 2024). This integration is anticipated to gradually reduce storage, transportation, and delay-related expenses, directly affecting import costs and, subsequently, the prices of goods.

-Improving transparency and reducing corruption: The system minimizes human intervention while providing comprehensive electronic monitoring of operations (Customs Uni-Pass International Agency CUPIA). This, in turn, enhances tax compliance and reduces the informal economy. The Directorate General of Customs has reported the following figures, which reflect these outcomes: over 6,000 economic operators registered in the ALCES system, all customs services interconnected via fiber optic networks or satellite links, over 245,000 declarations processed within the ALCES system, full coverage of commercial goods customs clearance operations, and complete network integration of the new customs information system, with all customs offices connected to the system (GENERAL DIRECTORATE OF ALGERIAN CUSTOMS, 2024, p. 16).

The state of the Algerian customs system prior to and following the implementation of the ALCE system can be summarized in the table below:

Table 1. The state of the Algerian customs system before and after the implementation of the ALCE system

Indicator	**Before applying the Alces system**	**After applying the Alces system**
Customs clearance time	21 days (and sometimes months)	Noticeable decrease (several days)
Logistics performance	LPI (2.3/5)	Gradual improvement expected
Trade volume processed	130 million tons per year	Same volume with greater efficiency
Customs revenue	Relatively low due to leakage	Expected increase
Logistics costs	High	Gradual decrease

source : Prepared by the researcher, Based on the above data.

3.4 Challenges of implementing the Alces system within the framework of the digital transformation of the Algerian customs system

There are several challenges facing the implementation of the ALCES system, which we summarize in the following points: (Belamri & Ziane, 2025, p. 499)

-Despite advancements in Algeria's information and communication technology (ICT) infrastructure, it remains behind worldwide norms. This indicates a lack of digital preparedness, which subsequently hinders the efficient development and implementation of the ALCES system

-There is an absence of comprehensive legal frameworks to facilitate the adoption of the electronic customs system (UNI-PASS). Moreover, a degree of legal fragmentation has been noted within the current Algerian regulatory system, especially with customs operations, which complicates the integration of the electronic customs system and contributes to the delays in its full implementation.

-Despite the initiation of the computerized customs system in Algeria in 2019, its full implementation across the country remains incomplete. The postponements in execution can be ascribed to many limitations, including:

-Inadequate collaboration with the private sector, as public-private partnerships in Algeria are underdeveloped, has hindered the effective implementation of the computerized customs system, which requires strong cooperation between government and private entities to succeed.

-Limited comprehensive training programs, with a significant lack of focused capacity-building initiatives for stakeholders and users of the ALCES system.

-The dependence on restricted communication channels to enhance knowledge and facilitate the adoption of the new ALCES customs system has hindered effective training and stakeholder engagement, which are crucial for successful implementation.

4. CONCLUSION

This research paper examines a significant issue at both national and global levels, namely the digitalization of customs systems as an essential element of international commerce within the framework of digital transformation. It uses the Algerian Customs information system, ALCES, as a case study to reach its goals. The implementation of this system has led to better revenue collection, easier trade with other countries, and more effective and open customs administration. However, its overall effectiveness depends on solving the technical and human problems that come with digital transformation, like not giving employees enough training and having old technology, which can hinder the system's performance and user adoption.

The research produced the following **results**:

-The digitization of customs systems serves as an effective tool for improving the efficiency of international commerce by expediting operations, lowering transaction costs, and augmenting the flexibility of economic activities;

-Digitalization enhances customs administration efficiency by enhancing revenue collection, accelerating clearing processes, and diminishing dependence on physical inspections, thereby promoting more seamless commerce flows;

-The digital transformation of customs processes serves as a strategic initiative that bolsters the national economy by enhancing transparency, optimizing the business climate, and attracting foreign investment, thus facilitating sustained economic development;

-The ALCES system exemplifies the results of international institutional collaboration and signifies a qualitative enhancement in the modernization of the Algerian customs administration, with concrete beneficial effects for diverse economic players;

-The customs digitization initiative seeks to augment operational efficiency, bolster transparency, and streamline international commerce, consequently boosting the national economy's overall competitiveness ;

-The ALCES system has facilitated a structural transition from a conventional customs administration to a contemporary digital framework, enhancing the efficiency and transparency of international commerce while bolstering comprehensive economic and financial reforms;

-The system has contributed to the following outcomes, as confirmed by quantitative evidence:

-A significant reduction in the time required for customs clearance, from approximately 21 days to substantially reduced timeframes.

-Increased efficacy in the processing of trade flows that exceed 130 million tons annually;

-Improved customs revenue collection;

-Increased transparency and the reduction of corruption risks;

-The comprehensive digitalization, which includes over 6,000 economic operators and 245,000 customs declarations, is facilitated by fiber-optic networks and satellite communication systems that ensure the interconnection of customs services.

Notwithstanding the advancements realized via the ALCES system, its overall efficacy is dependent on the satisfaction of essential digital transformation prerequisites, specifically the enhancement of digital

infrastructure, the widespread adoption of training programs, and the fortification of integration with associated systems (ports, banking institutions, and trade platforms). **Consequently**, the following suggestions may be articulated:

-Expedite the whole digital transition by universally implementing the ALCES system across all customs activities to guarantee optimal efficiency;

-Fortify digital infrastructure by network upgrading, augmenting system velocity, and guaranteeing service continuity to avert technological breakdowns that might impede supply chains;

-Enhance training and capacity-building initiatives for customs officials and economic operators, guaranteeing the effective use of digital technology and the reduction of operational mistakes;

-Improve institutional integration by creating efficient interoperability between the ALCES system and other pertinent systems (ports, banking sector, and international trade platforms) to facilitate real-time data interchange;

-Establish risk management systems to reduce dependence on physical inspections of commodities and prioritize high-risk activities; therefore, expedite customs clearance processes.

Enhance the legal and regulatory environment to conform to the demands of digital transformation, especially with electronic signatures, data interchange, and information security.

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