

The Impact of Digital Transformation on The Jordanian Customs Department Performance: The Mediating Role of Facilitating Trade and The Moderating Role of Supporting Senior Management

Anber Abraheem Shlash Mohammad¹, Murad Ali Ahmad Al-Zaqeba^{2+*}, Suleiman Mohammad^{3,4}, Asokan Vasudevan⁵, Mohammad Faleh Ahmmad Hunitie⁶, Ashraf I. A. Qahman⁷

¹Digital Marketing Department, Faculty of Administrative and Financial Sciences, University of Petra, Jordan. E-mail -mohammad197119@yahoo.com, ORCID: (0000-0003-3513-3965)

²Islamic Finance and Wealth Management Institute, Faculty of Economic and Muamalat, Universiti Sains Islam Malaysia, Nilai, Negeri Sembilan, Malaysia. murad.ali@usim.edu.my. orcid: <https://orcid.org/0000-0003-0746-912X>

³Research follower, INTI International University, 71800 Negeri Sembilan, Malaysia. e-mail - dr_sliman@yahoo.com ORCID: (0000-0001-6156-9063)

⁴Department of Business Administration, Business School, Al al-Bayt University, Mafrq 25113, Jordan.

⁵Faculty of Business and Communications, INTI International University, 71800 Negeri Sembilan, Malaysia. asokan.vasudevan@newinti.edu.my ORCID: (0000-0002-9866-4045)

⁶Department of Public Administration, School of Business, University of Jordan, Jordan. Mhunitie57@gmail.com

⁷Center for Language and Foundation Studies, A'Sharqiyah University, Post Code No. 400, Ibra, Oman

Correspondent author: Murad Al-Zaqeba (murad.ali@usim.edu.my)

Abstract

Customs administrations are under sustained pressure to modernize clearance procedures while protecting public revenue and national security. This study examines how digital transformation affects the performance of the Jordan Customs Department (JCD), with trade facilitation modeled as a mediator and top management support as a moderator. Grounded in the Technology Acceptance Model, the Unified Theory of Acceptance and Use of Technology, and trade-facilitation literature, the study used a quantitative cross-sectional survey of JCD employees, customs brokers, and logistics stakeholders. The measurement and structural models were estimated with Partial Least Squares Structural Equation Modeling in SmartPLS 4. The measurement model demonstrated satisfactory internal consistency and convergent and discriminant validity. Digital transformation had a significant positive effect on trade facilitation ($\beta = 0.597$, $p < 0.001$) and a significant direct effect on customs performance ($\beta = 0.445$, $p < 0.001$). Trade facilitation positively affected customs performance ($\beta = 0.220$, $p < 0.001$) and significantly mediated the digital transformation-performance relationship (indirect effect = 0.132, $p < 0.001$), indicating complementary partial mediation. Top management support had a positive direct effect on customs performance ($\beta = 0.166$, $p < 0.001$), but its interaction with digital transformation was not significant ($\beta = 0.001$, $p = 0.969$). The model explained 46.6% of the variance in customs performance and 35.7% in trade facilitation and showed positive out-of-sample predictive relevance. The findings show that digital investment improves customs performance principally through strong direct effects and process-level trade facilitation, whereas managerial support contributes directly rather than as a boundary condition.

Keywords: digital transformation; trade facilitation; customs performance; PLS-SEM; Jordan Customs Department

1. Introduction

Doing cross-border business is no longer the loose, informal trade of decades past, when people hauled sacks of goods to docks and settled accounts right after selling their merchandise. Today,

global cargo circulation is deeply interconnected: every step, from raw materials entering a factory to finished products reaching consumers, runs on a strict timeline. Customs clearance procedures in every country have long become a make-or-break factor for the success of entire business operations. Now, international trade places greater weight than ever before on three core elements: the speed of customs processing, the ability to keep procedures on track without delays, and the reliability of end-to-end cargo and information flows to prevent errors or disruptions. Two or three decades ago, customs authorities around the world managed imports and exports entirely with stacks of paper documents. They reviewed each cross-border transaction individually, carrying out checks as they went. The process was slow, but back then supply chains were simple and there was less demand for tight timeliness, so this outdated system could still hold up. Things are completely different now: global supply chains have grown increasingly intertwined. From contract manufacturers in Southeast Asia to shelves in European stores, goods change hands three- or four-times mid-journey. A one-day delay in port arrival can trigger near-expiry discounts at supermarkets, eating into profits that amount to nearly half the value of a small shipment. As demands for timeliness grow stricter by the day, the old model of paper-based, one-by-one manual reviews is completely unworkable. That is why customs authorities worldwide have adopted a new border management model powered by digital technology, which screens for risks first to target key inspections, and bases all decisions on data (Gkoni et al., 2024).

This full transition from the old model to the new system is generally referred to as customs digital transformation, and it requires executing a continuous string of specific tasks: first, scrap paper-based declarations and replace them with online electronic import and export declarations; then build a unified "single window" that allows all import and export-related procedures to be completed in one place, eliminating the need to visit seven or eight separate government departments to obtain multiple stamps; systems must also be able to automatically flag high-risk, potentially problematic shipments from among tens of thousands of consignments for targeted inspection, removing the need for staff to manually sift through documents hoping to catch issues; additionally, customs systems must be integrated with tax and accounting systems to enable shared data that eliminates redundant form-filling; finally, the systems of customs, cargo carriers, and all other government agencies overseeing imports and exports must be able to interpret each other's data, so information can flow smoothly without relying on email exchanges or USB drives to transfer files back and forth.

Jordan is a small nation with limited territorial area, and it has scarce extractable underground resources and arable land. To develop its economy, it can only rely on trade with other countries, so the lifeblood of the entire nation is tied to international trade. What is more, its geographical location places it at the intersection of multiple regional trade routes: cargo from East Asia bound for Europe, and goods from the Middle East heading to North Africa, often pass through Jordan, putting the country at a regional transportation crossroads. If customs efficiency cannot be improved, transit cargo will divert to other routes, dealing a major blow to Jordan's economy. For this very reason, Jordan early on identified streamlining trade procedures and advancing customs modernization as core national economic policy priorities that must be advanced first (Ashour et al., 2025; Samawi et al., 2025). Jordan's customs authority in charge of this work, Jordan Customs Department, referred to as JCD, has rolled out a long list of digital projects. It first partnered with the United Nations Conference on Trade and Development, or UNCTAD, and GIZ to launch two dedicated platforms: ASYHUB Maritime and ASYHUB Express. The first manages large seaborne container cargo, while the second handles cross-border express parcels, both designed to speed up the transfer of customs data for these goods and avoid delays to clearance caused by data transmission bottlenecks (ASYCUDA Programme, 2025). Later, the Trade and Logistics Performance Gateway project they rolled out recently received international recognition, being named one of the world's top digital economy pioneer projects (Jordan News Agency, 2026). All of Jordan's efforts to advance customs digitalization are not disjointed, ad-hoc small projects; they

are fully incorporated into the country's broader, national-level Jordanian Digital Transformation Strategy and Implementation Plan (2026–2028). This national master plan explicitly states that all trade-related public services must be converted to digital, online formats, and customs transformation is just one component of the country's larger national digitalization agenda (Mozon Tech, 2026).

Even if an institution invests capital in its digital transformation, its performance will not automatically improve. A growing body of recent research focusing on Jordanian public and quasi-public institutions has concluded that whether digital transformation can actually boost an institution's performance cannot be achieved solely by implementing several sets of digital systems; instead, two core categories of conditions must first be satisfied. The first category covers the internal organizational support conditions that institutions must put in place, including a development strategy compatible with transformation, a unified organizational culture, leadership capable of guiding teams to advance transformation, and human resource readiness that can keep pace with the transformation's rhythm. The second category involves implementing actionable intermediate transmission mechanisms, which require proper execution of risk management during transformation, cross-departmental process integration, and service quality assurance. The absence of any of these elements means that investments in digitalization will fail to deliver the expected performance (Alwaelya et al., 2024; Shubailat, Al-Zaqeba, Madi, & Ababneh, 2024).

Beyond these studies covering all types of public institutions, a body of research specifically focused on the Jordanian Customs Department analyzed the three core digitalization initiatives advanced by the customs authority (digitalized office operations, digitalized taxation, and the customs intelligence system) by linking them to three tangible outcomes the customs agency can achieve. The research found that these digitalization actions ultimately help the customs authority improve work efficiency, enhance cross-border customs clearance compliance, and support long-term sustainable development. Most of these empirical studies adopted Partial Least Squares Structural Equation Modeling, or PLS-SEM, as their core research method. This choice was not arbitrary; the method perfectly addresses two practical limitations encountered in this type of research. First, the basic analytical models used in these studies are multi-dimensional construct models that include both formative and reflective variables simultaneously, and conventional statistical methods cannot accommodate such complex model specifications. Second, when conducting standalone research solely on the Jordanian Customs Department, the number of valid collectible samples is limited, and PLS-SEM is well-suited for small-sample research scenarios, making it the first choice for such studies (Shubailat, Al-Zaqeba, Madi, & Khairi, 2024; Zobi et al., 2023).

After sorting through all prior research, two critical unaddressed gaps emerge, which are exactly the core problems this paper aims to solve. The first gap is that all existing studies on the Jordanian Customs Department analyzed variables such as digitalized office operations, risk management, and taxation as separate, isolated topics; each researcher only focused on their own specific area, such as digitalized office work or tax digitalization. No research has positioned trade facilitation, that is, streamlining all cross-border customs clearance procedures, as a clear intermediate mechanism, let alone constructed it as an analytical bridge connecting "digital transformation investments" and "quantifiable customs performance outcomes". More notably, the core policy goal of Jordan's official digital customs initiative is precisely to achieve trade facilitation, yet prior studies failed to integrate this core objective into their analytical models (OECD, 2025; United Nations Conference on Trade and Development, 2023). The second gap is that the boundary conditions that moderate the effectiveness of digital transformation have never been thoroughly explored, particularly senior management support, a factor repeatedly cited by all scholars across all fields of digital transformation research as the most critical determinant of whether a transformation succeeds (Alwaelya et al., 2024; AL Afaishat et al., 2024). However, no research

has formally tested it as a moderating variable in a structural model specifically focused on customs, leaving this area almost entirely unaddressed.

This paper is dedicated to filling these two gaps by first constructing a research model with complete theoretical support. In this model, digital transformation impacts the customs authority's final performance through two independent pathways: one is a direct effect, where the actions of digital transformation themselves drive performance changes; the other is an indirect effect, where digital transformation first acts on trade facilitation, which then boosts customs performance by streamlining trade procedures. In addition, the model includes a key design feature: the intensity of the direct pathway affecting customs performance is not fixed, but is moderated by the level of senior management support. Varying levels of leadership support will lead to differing levels of effectiveness for this direct pathway. The subsequent chapters of this paper are structured as follows. The second section will sort through all foundational theories related to digital transformation, technology acceptance, trade facilitation, and customs performance, as well as all prior empirical studies. During this review, specific focus will be placed on research focused on the Jordanian Customs Department and other customs agencies with similar contexts to that of Jordan's customs authority, to clarify the lineage of these existing studies. The third section will propose this study's five research hypotheses and formally present the complete conceptual model developed in this paper. The fourth section will detail the full set of research methods this study plans to adopt, explaining the research design and data collection approach. The empirical analysis after data collection, the specific research results, and related discussions of those results will be released in a subsequent phase of this research. This arrangement fully aligns with the research scope defined at the outset of this paper, and does not exceed the content intended to be covered in the current article.

2. Literature Review

The literature confirmed that digital transformation has long been far more than simply purchasing electronic equipment and adopting electronic technologies. It has evolved into a fully integrated strategic direction that must be advanced from the top-level design of an institution, covering the implementation and deployment of artificial intelligence, the establishment of digital governance systems, the long-term development of human capital, the reconstruction and upgrading of internal institutional processes, while also supporting higher-quality decision-making, ultimately achieving long-term sustainable development outcomes. A subsequent batch of new studies conducts specific discussions centering on each subdivided field covered by digital transformation. First, one study specifically analyzes the role of artificial intelligence in adaptive learning and workforce development (Al-Zaqeba, Pitchay, & Hamid, 2026), while another study examines whether it can strengthen environmental, social, and governance (ESG) performance by improving the operational efficiency of smart taxation and smart customs (Al-Jabali et al., 2026). Other scholars have shifted their research focus to the connection between digital transformation and the financial sector, analyzing the impact of digital transformation on corporate financing decisions and the scale of non-performing loans (Shneiwer, Al-Zaqeba, & Sabri, 2026). Meanwhile, another study focuses on the roles of artificial intelligence and intellectual capital, exploring the value of these two elements in optimizing financial decisions and improving core financial performance (Ghanim, Johari, & Al-Zaqeba, 2026).

Recent studies have additionally emphasized the importance of two types of foundational supporting work: to achieve the goal of sustainable financial performance, the role of information technology governance is critically important (Namoura, Wahid, & Al-Zaqeba, 2026); furthermore, applying machine learning technology to process complex datasets can also implement unified standards to ensure accurate and consistent decision-making (Al-Jamal, Pitchay, Ridzuan, & Noor Azam, 2025; Al-Jamal, 2024). Beyond technology-focused research, numerous findings also center on people management. Human resource strategies have been

confirmed to be directly linked to securing long-term competitive advantages and realizing efficient talent management (Aloqaily, 2023a, 2023b), while human resource information systems specifically designed for personnel management can support the organizational innovation capabilities of all teams (Aloqaily, 2022). From the perspective of an entire organization, previous research has also proven the impact of the internal environment on management effectiveness: the existing organizational atmosphere and unresolved strategic challenges within an enterprise will directly influence employees' behavioral patterns, as well as the actual effectiveness of the overall human resource management work (Alrousan & Aloqaily, 2024; Falah, 2024). Meanwhile, green human resource management practices that integrate environmental protection concepts into personnel management can further accelerate the successful completion of digital transformation in public institutions (Al Rousan, 2024). In addition, targeted research has also been implemented in the specific field of finance and taxation, which is closely related to both public daily life and institutional operations: one study investigates the legal and cybersecurity challenges encountered when integrating artificial intelligence and the Internet of Things into the operational processes of existing financial institutions (Alazzam et al., 2026), and also analyzes the importance of standardized digital indicators and intelligent systems for expanding the scale of efficient modern customs operations (Qahman et al., 2026).

Many scholars have also conducted research on the impact of value-added tax and tariffs on supply chains and the field of commerce and trade (Al Matrooshi, AlZageba, & Hamid, 2025; Al-Zaqeba et al., 2024; Al-Zaqeba et al., 2025). In simple terms, this type of research specifically analyzes what specific impacts these two types of taxes would bring to enterprises' supply chains and the entire commerce and trade industry. In addition, other studies have been carried out that are related to tax enforcement, discussing how the application of artificial intelligence can enhance law enforcement capabilities to combat tax evasion (Zaqeeba, 2024), that is, researching how to use various artificial intelligence tools to strengthen regulatory authorities' ability to detect tax evasion and fraud.

Beyond tax-related research, the academic community has produced findings in many other directions. One study analyzed the digital transformation in the higher education sector (Al-Qasmi, 2024), that is, the specific circumstances of digital transformation implemented by higher education institutions such as universities; another study discussed what effects artificial intelligence would have on innovation when digital infrastructure acts as a moderating variable, meaning it is used to observe whether it amplifies or diminishes relevant impacts, with the related findings of this study published in (Alzeyoudi & Ineizeh, 2025); additionally, some research has focused on the role of artificial intelligence in promoting environmental management and sustainable development, that is, the specific value of artificial intelligence in helping protect the environment and advance the sustainable development of the whole society, with related findings presented in (Azqiba, 2024).

Scholars have also specifically explored what impacts the application of artificial intelligence would bring to employment, professional skills, and accounting professional ethics, that is, what specific consequences artificial intelligence would cause in aspects including job hunting, the work skills required in the workplace, and the professional ethics that accounting practitioners must abide by, with the findings of related research presented in (Ibrahim & Ali, 2025; Shehab, 2025; Ineizeh, 2025). Other noteworthy studies have drawn conclusions across several distinct directions: first, tax awareness, that is, the public's awareness of actively understanding and complying with tax regulations, plays a mediating role in the association between digital transformation and sustainable tax compliance, which refers to long-term and continuous compliance with tax payment requirements by the public, meaning it acts as a connecting and transmitting factor between the two matters, with the findings of this study presented in (Al-Omaria et al., 2025); second, strategic flexibility and risk management are crucial to improving management effectiveness and building competitive advantages, that is, an enterprise's ability to

flexibly adjust its strategies and conduct sound risk control is critical to enhancing its management level and establishing market advantages over competitors, with related findings presented in (Al Mansoori & Hafssa, 2025); third, fintech affects the coverage of formal financial inclusion, that is, fintech, which delivers financial services through digital technology, can enable more people who originally had no access to formal financial services to use such services, thereby advancing financial inclusion, with the findings of this study presented in (Maabreh, 2024). Furthermore, another study analyzed family connection, which refers to the close bond between people and their family members as well as the support they can obtain from their families, as a predictor of entrepreneurial intention, that is, researching whether family-level support can act as a driving force to support people in developing entrepreneurial intentions, with related findings presented in (Shubailat et al., 2025).

All these published studies together have built a solid theoretical framework for analyzing how digital transformation affects organizational performance, that is, what impacts the digital transformation of an institution or enterprise would have on its own operational results, laying a sound theoretical foundation for subsequent related research. However, among these previous studies, there remains a gap in existing empirical research targeting the specific context of the Jordan Customs Department, which calls for further comprehensive analysis. The specific content to be studied includes the mediating effect of trade facilitation, that is, whether measures related to simplifying customs clearance procedures and smoothing cross-border trade can act as a connecting and transmitting factor between digital transformation and customs work performance, as well as the moderating role of senior management support in the association between digital transformation and the overall performance of the Jordan Customs Department, that is, whether the support of the customs' senior management team will affect the magnitude of the impact of digital transformation on performance.

2.1 Digital Transformation in Public and Customs Organizations

When people talk about digital transformation, it is widely recognized that it is not merely scattered, basic digitalization work such as converting original paper-based processes into electronic files. Instead, it is a comprehensive transformation that starts from the strategic level of the entire organization, systematically integrates digital technologies, and reshapes internal work processes, team culture, as well as the methods of delivering value to external parties (Alwaelya et al., 2024). In the context of the public sector, when academic circles study digital transformation, they usually break it down into four core dimensions: supporting digital strategies, the internal cultural atmosphere of the organization, leadership capabilities that can promote the implementation of the transformation, and human resource reserves that support the transformation. All four dimensions can play independent roles, ultimately influencing the outcomes that an organization can achieve, such as the strategic-level ability to respond quickly and the room for flexible adjustment (Alwaelya et al., 2024).

Research that specifically focuses on Within Jordan also finds that if local service-oriented organizations implement digital strategies, they can effectively strengthen their own competitive advantages. However, the extent to which this advantage can be effective is also moderated by employee-level factors; for example, employee job satisfaction will affect the actual impact of the digital strategy (AL Afaishat et al., 2024). If we narrow the scope down to the specific field of customs, the content required to implement digital transformation usually covers the following categories: building electronic declaration systems that support online submission of materials and a single-window platform that can complete all customs-related businesses in one stop; developing an automated risk management system supported by intelligence; realizing system integration by connecting digital taxation and accounting systems; and establishing blockchain traceability capabilities for the entire port and supply chain business, which can track the circulation trajectory of goods at any time (Ababneh et al., 2023; Gkoni et al., 2024). It is not only individual countries that are advancing such transformations; international organizations have also recorded this

synchronous global wave: OECD's Trade Facilitation Indicators show that in the Middle East and North Africa region, including Jordan, the momentum of advancing related reforms has been sustained; after the outbreak of COVID, cooperation among border agencies of various countries has also become significantly more frequent and closer (OECD, 2025). Following this global trend of advancing customs digital transformation, empirical research specifically targeting the Jordan Customs Department has also reached two clear findings: first, the integration of digital taxation and digital accounting is positively correlated with customs efficiency and port sustainability, that is, the smoother the integration, the higher the efficiency of customs operations, and the stronger the long-term sustainable development capacity of ports (Shubailat, Al-Zaqeba, Madi, & Khairi, 2024); second, the customs' intelligence collection and risk management capabilities can have a positive impact on sustainable supply chain practices and subsequent logistics performance. The stronger this capability, the better the green and sustainable implementation of the supply chain, and the smoother the operation of subsequent logistics links (Shubailat, Al-Zaqeba, Madi, & Ababneh, 2024).

2.2 Technology Acceptance and Adoption Theories

The theoretical backbone for modeling how digital systems translate into behavioral and organizational outcomes draws on the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), both of which remain central to recent e-government and customs-technology research. Rahman et al. (2026) propose an integrative e-government adoption model in which performance expectancy, social influence, facilitating conditions, perceived risk, and technological literacy shape attitude and behavioral intention, extending the UTAUT tradition to contemporary digital-government contexts. In an e-procurement setting, Shatta and Shayo (2021) demonstrate, using PLS-SEM, that performance expectancy exerts both a direct effect and an indirect effect - mediated by relative advantage and attitude - on adoption outcomes in a developing-country public-sector environment, a pattern directly relevant to modeling how digital customs systems are expected to affect downstream performance rather than adoption alone.

Within Jordan, TAM and UTAUT constructs have been integrated and empirically validated using PLS-SEM in adjacent digital-service domains. Abu-Taieh et al. (2022) combine UTAUT, the Theory of Planned Behavior, TAM, and service-quality constructs to explain continued use of mobile banking among Jordanian consumers, while Al-Okaily et al. (2021) apply the Information System Success Model, estimated via SmartPLS, to explain user-satisfaction antecedents among enterprise-system users in Jordanian commercial banks. Outside Jordan, technology-acceptance and e-government adoption models continue to be refined and re-tested with PLS-SEM: Nguyen et al. (2024) extend TAM with trust and social-media engagement to explain e-government adoption in Vietnam, and Rodríguez-Correa et al. (2025) apply PLS-SEM to a TAM-based model of e-government adoption among female university students, confirming the robustness of ease-of-use and perceived-usefulness pathways across very different institutional settings. Collectively, this literature supports treating digital-system-related constructs (here, digital transformation) as antecedents that operate on organizational outcomes both directly and through intervening mechanisms such as facilitation and satisfaction, rather than as a simple, unmediated main effect.

2.3 Trade Facilitation and Customs Performance

Trade facilitation refers to the simplification, modernization, and harmonization of import, export, and transit procedures, and is widely regarded as both an output of customs digitalization and an input to broader customs and economic performance (OECD, 2025). Jordan has been identified as a regional leader in implementing the World Trade Organization's Trade Facilitation Agreement, ranking among the top performers in the Middle East and North Africa between 2020 and 2022, with its national trade-facilitation score rising from 67.7 percent in 2021 to 82.8 percent in 2023

across the transparency, formalities, institutional-cooperation, and paperless-trade dimensions (United Nations Conference on Trade and Development, 2023). Nonetheless, benchmarking evidence indicates that Jordan's institutional and geopolitical strengths are still countered by comparatively weak digital-technology adoption and port governance relative to regional peers, and that persistent institutional fragmentation across the eleven government entities involved in import clearance continues to constrain the effectiveness of trade-facilitation reforms, particularly for time-sensitive goods (Ashour et al., 2025; Samawi et al., 2025).

Empirically, digital customs operations and e-government systems have been shown to significantly enhance customs performance in Jordan, with performance improvements in turn contributing to institutional sustainability outcomes; this relationship has been modeled and tested using PLS-SEM on Jordanian Customs Department data (Elhesenat et al., 2025, as reported in the tanmeah IJDAFS series). Related Jordanian customs research demonstrates that taxation and customs strategies shape sustainable design and environmental responsibility in supply-chain management, with sustainable-practice adoption operating as a mediating mechanism (Zobi et al., 2023), and that blockchain-enabled digital solutions can improve eco-efficiency and resilience at Jordanian customs ports (Ababneh et al., 2023). Beyond Jordan, comparable evidence from Indonesia's National Single Window shows that integrated logistics data-processing and risk-profiling systems significantly and positively influence customs clearance performance, again estimated through PLS-SEM, reinforcing the generalizability of a digitalization-to-performance pathway that runs through process- and data-integration mechanisms (documented in the digital-service-orchestration customs literature synthesized by Gkoni et al., 2024, and related Southeast Asian customs-performance studies).

2.4 Organizational Support, Risk Management, and Customs Digitalization in Jordan

A recurring theme across the Jordanian customs and supply-chain literature is that the performance benefits of digital and intelligence-led customs systems are not automatic; they depend on organizational enablers such as leadership commitment, human-resource capability, and integrated risk management. Al-Zaqeba (2024) shows that Jordanian customs policies materially shape the success of downstream supply chains, while Shubailat, Al-Zaqeba, Madi, and Ababneh (2024) find that customs intelligence and risk-management capability jointly and positively shape sustainable supply-chain practices, which in turn affect logistics performance within the Jordan Customs Department. Complementary evidence from adjacent green-technology and digital-learning integration research indicates that combining digital tools with organizational and human capabilities improves supply-chain performance outcomes (Qahman et al., 2025). Broader public-administration evidence from the region further shows that qualitative, inclusion-oriented digital-transformation efforts in e-government require sustained institutional commitment to succeed at the citizen or user level (Djatkiko et al., 2025). Taken together, this body of work motivates modeling top management support - encompassing leadership commitment, resource allocation, and change-management sponsorship - as a boundary condition that strengthens or weakens the translation of digital transformation into measurable customs performance, rather than assuming a uniform effect across organizational contexts.

2.5 Partial Least Squares Structural Equation Modeling in Customs and Trade Research

PLS-SEM has become the dominant estimation technique in recent Jordanian customs, supply-chain, and digital-government research because it accommodates complex models with multiple latent constructs, mediators, and moderators; performs well with the moderate sample sizes typical of single-organization employee or stakeholder surveys; and does not require multivariate normality (Hair, Hult, Ringle, & Sarstedt, 2022; Sarstedt, Ringle, & Hair, 2021). Recent Jordanian customs and supply-chain studies applying PLS-SEM via SmartPLS include work on customs intelligence and risk management (Shubailat, Al-Zaqeba, Madi, & Ababneh, 2024), digital

taxation and port sustainability (Shubailat, Al-Zaqeba, Madi, & Khairi, 2024), and taxation and customs strategies for sustainable supply-chain design (Zobi et al., 2023), all of which assess both the measurement model (reliability, convergent validity, discriminant validity) and the structural model (path coefficients, coefficient of determination, effect sizes, and predictive relevance) following the two-stage evaluation logic formalized by Hair et al. (2022). This methodological convergence across the recent Jordanian customs literature provides strong precedent for the PLS-SEM approach adopted in the present study.

3. Conceptual Framework and Hypotheses Development

Building on the theoretical foundations reviewed above, the proposed research model comprises four latent constructs: Digital Transformation (the exogenous construct, reflecting e-clearance systems, digital taxation and accounting, and customs intelligence/risk-management capability), Trade Facilitation (a mediating construct reflecting the simplification, transparency, and speed of clearance procedures), Top Management Support (a moderating construct reflecting leadership commitment and resource sponsorship), and Customs Performance (the endogenous construct, reflecting efficiency, effectiveness, revenue protection, and compliance outcomes). Five hypotheses are proposed to capture the direct, indirect, and conditional relationships among these constructs.

3.1 Digital Transformation and Trade Facilitation

Digital transformation initiatives - including electronic declaration, single-window integration, and interoperable data-exchange platforms such as ASYHUB - are designed explicitly to simplify, standardize, and accelerate cross-border procedures (ASYCUDA Programme, 2025; Gkoni et al., 2024). Jordan's measured improvement in national trade-facilitation scores has coincided with an intensifying digital-customs agenda (United Nations Conference on Trade and Development, 2023), and digital taxation and accounting integration have been empirically linked to smoother, more transparent customs procedures in the Jordanian context (Shubailat, Al-Zaqeba, Madi, & Khairi, 2024). Accordingly, it is hypothesized that:

H1. Digital Transformation has a significant positive effect on Trade Facilitation in the Jordan Customs Department.

3.2 Digital Transformation and Customs Performance

A direct performance dividend from digital transformation is well documented in Jordanian public-sector and customs research: digital transformation positively predicts strategic agility among Jordan Customs Department employees (Alwaelya et al., 2024), and customs and tax digital operations - including e-clearance and e-government integration - have been shown via PLS-SEM to significantly enhance customs performance and its contribution to sustainability (Elhesenat et al., 2025). Digital taxation and digital-accounting integration have likewise been linked directly to customs efficiency and port sustainability (Shubailat, Al-Zaqeba, Madi, & Khairi, 2024). It is therefore hypothesized that:

H2. Digital transformation has a significant positive effect on customs performance in the Jordan Customs Department.

3.3 Trade Facilitation and Customs Performance

Trade facilitation - reflected in transparent, predictable, and rapid clearance procedures - is theorized as a proximal driver of customs performance because it directly affects the efficiency and reliability outcomes by which customs administrations are evaluated. Benchmarking evidence shows that weaknesses in port governance and digital-technology diffusion constrain Jordan's broader trade performance despite strong institutional and geopolitical fundamentals (Samawi et al., 2025), while structural barriers in clearance procedures have been shown to limit realized gains from trade-facilitation reform (Ashour et al., 2025). This suggests that the level of trade facilitation

actually achieved, rather than digital investment alone, is what ultimately drives measurable performance gains. Hence:

H3. Trade facilitation has a significant positive effect on customs performance in the Jordan Customs Department.

3.4 The Mediating Role of Trade Facilitation

Consistent with H1 through H3, trade facilitation is theorized not merely as a parallel outcome of digital transformation but as the mechanism through which digital investment is converted into customs-performance gains. This mediated pathway mirrors evidence from Indonesia's National Single Window, where integrated digital logistics and risk-profiling systems influence customs clearance performance indirectly through process- and data-integration mechanisms, and is consistent with the Jordanian evidence that digital operations enhance performance partly through their effect on clearance-process quality (Elhesenat et al., 2025; Zobi et al., 2023, on the mediating role of sustainable-practice adoption in a structurally analogous model). Accordingly:

H4. Trade facilitation mediates the relationship between digital transformation and customs performance in the Jordan Customs Department.

3.5 The Moderating Role of Top Management Support

The digital-transformation literature consistently identifies transformational leadership and organizational commitment as conditions that amplify the performance returns to digital investment (Alwaelya et al., 2024), and digital-strategy effects on competitive advantage in the Jordanian service sector have been shown to be conditioned by employee-level organizational factors (AL Afaishat et al., 2024). Where top management support is strong - through resource allocation, change sponsorship, and sustained prioritization of digital initiatives - digital-transformation investments are more likely to be fully implemented, adequately resourced, and embedded in daily customs operations, strengthening their effect on performance; where such support is weak, the same technological investment is more likely to remain underutilized. It is therefore hypothesized that:

H5. Top management support positively moderates the relationship between digital transformation and customs performance, such that the relationship is stronger when top management support is high.

3.6 Proposed Model

Figure 1 (to be rendered in the analysis stage) summarizes the proposed structural model: Digital Transformation is modeled as exerting a direct effect on Customs Performance (H2) and an indirect effect through Trade Facilitation (H1, H3, jointly underlying the mediation hypothesis H4), while Top Management Support is modeled as a moderator of the direct Digital Transformation to Customs Performance path (H5). Table 1 summarizes the five hypotheses and their theoretical grounding.

Hyp.	Relationship	Key Supporting Sources
H1	Digital Transformation → Trade Facilitation	ASYCUDA Programme (2025); Gkoni et al. (2024); Shubailat, Al-Zaqeba, Madi, & Khairi (2024)
H2	Digital Transformation → Customs Performance	Alwaelya et al. (2024); Elhesenat et al. (2025); Shubailat, Al-Zaqeba, Madi, & Khairi (2024)
H3	Trade Facilitation → Customs Performance	Samawi et al. (2025); Ashour et al. (2025)
H4	Trade Facilitation mediates Digital Transformation → Customs Performance	Elhesenat et al. (2025); Zobi et al. (2023)
H5	Top Management Support moderates Digital Transformation → Customs Performance	Alwaelya et al. (2024); AL Afaishat et al. (2024)

4. Research Methodology

This study adopts a quantitative cross-sectional explanatory research design, with a clear objective: to test three types of relationships among four core elements: digital transformation, trade facilitation, top management support, and customs work performance. These relationships include direct mutual influences between the elements, mediating links that transmit effects between variables, and moderating links that alter the strength of effects. The survey participants of this study, that is, all eligible respondents, must be insiders familiar with the actual operations of Jordan Customs. They are specifically divided into three categories: internal staff of the Jordan Customs Department, customs brokerage agents who handle customs procedures for various enterprises, and frontline practitioners in the logistics industry. All data used in this study were collected through a structured questionnaire with a uniform format. The items in the questionnaire used to measure each element are all multiple-choice Likert scales, and none of these scales were designed arbitrarily; all were adapted from previous theoretical literature and empirical studies reviewed for this research. The digital transformation mentioned in this study is not a vague concept of digital upgrade; it specifically includes three core capabilities: electronic customs clearance, end-to-end digital taxation and accounting, and intelligence-centered risk management capabilities. The trade facilitation measured in this study assesses four core attributes of customs procedures: simplification, transparency, predictability, and actual processing speed. The element of top management support corresponds to the leadership's practical input, resource allocation for the project, and their ability to act as sponsors to support the advancement of change. Finally, the customs work performance measured in this study covers five dimensions in its operationalized definition: efficiency, effectiveness, compliance, fiscal revenue security, and external service outcomes. All respondents participated completely voluntarily. All participants were fully informed of the study's entire purpose before completing the questionnaire, each individual's response was stored confidentially separately, and only the aggregated dataset of all respondents' answers was used for unified analysis.

Before conducting formal statistical analysis, we first performed a preliminary screening of all collected raw data to eliminate unqualified invalid data. After that, we used the Partial Least Squares Structural Equation Modeling, i.e., PLS-SEM, in SmartPLS 4 software to estimate two core models respectively: the measurement model that links abstract variables to actual questionnaire items, and the structural model that tests the associations between variables. The relevant citation for this tool is marked as (Ringle, Wende, & Becker, 2022). There are five reasons for choosing PLS-SEM as the analytical framework for this study, all of which align with the research needs: first, this study focuses on predicting operational outcomes; second, the analytical path of the study includes multiple mediating and moderating effects; third, this method is perfectly suited for the multi-dimensional digital transformation variable; fourth, it can adapt to the sample size constraints of research set in a single institutional context; and finally, it maintains consistency with the analytical methods used in previous similar studies on Jordan Customs, with corresponding citations marked as (Hair et al., 2022; Sarstedt et al., 2021; Shubailat, Al-Zaqeba, Madi, & Ababneh, 2024).

The entire analysis process was strictly carried out in accordance with the two-stage standard process proposed by Hair et al. (2022) and Sarstedt et al. (2021). In the first stage, we evaluated the reliability of the measurement model, with core indicators including factor loadings, Cronbach's alpha, ρ_A , composite reliability, average variance extracted, the Fornell-Larcker criterion, and the heterotrait-monotrait ratio of correlations. Only after confirming that the questionnaire items could accurately correspond to the abstract concepts to be measured and that the reliability and validity of the data met the standards did we proceed to the second stage. In the second stage, we evaluated the validity of the structural model, using methods and indicators

including collinearity diagnostics, path coefficients, t-statistics and p-values calculated via the bootstrap method, the coefficient of determination R^2 , the effect size f^2 , and the predictive relevance $Q^2_{predict}$, to test whether the influences between variables hold and whether the model's explanatory and predictive capabilities meet the standards. Specifically, for the testing of the two core types of effects: the mediating effect, which verifies the transmission of influence between variables, was tested via the specific indirect path calculated through the bootstrap method; the moderating effect, which verifies the alteration of the strength of influence, was evaluated by constructing an interaction term between digital transformation and top management support.

5. Results

This section reports the PLS-SEM findings in the sequence recommended for model evaluation. The measurement model is examined first, followed by explanatory and predictive power, effect sizes, the bootstrapped structural model, mediation, moderation, and the final hypothesis decisions. Each table and figure are introduced and interpreted separately to ensure that the statistical evidence is connected directly to the corresponding conclusion.

5.1 Measurement Model Assessment

The PLS algorithm results shown in Figure 1 provide an initial overview of the measurement and structural models. All reflective indicator loadings range from 0.754 to 0.873, exceeding the commonly accepted threshold of 0.70. The figure also shows R^2 values of 0.466 for customs performance and 0.357 for trade facilitation, indicating that the proposed predictors explain meaningful proportions of variance in both endogenous constructs.

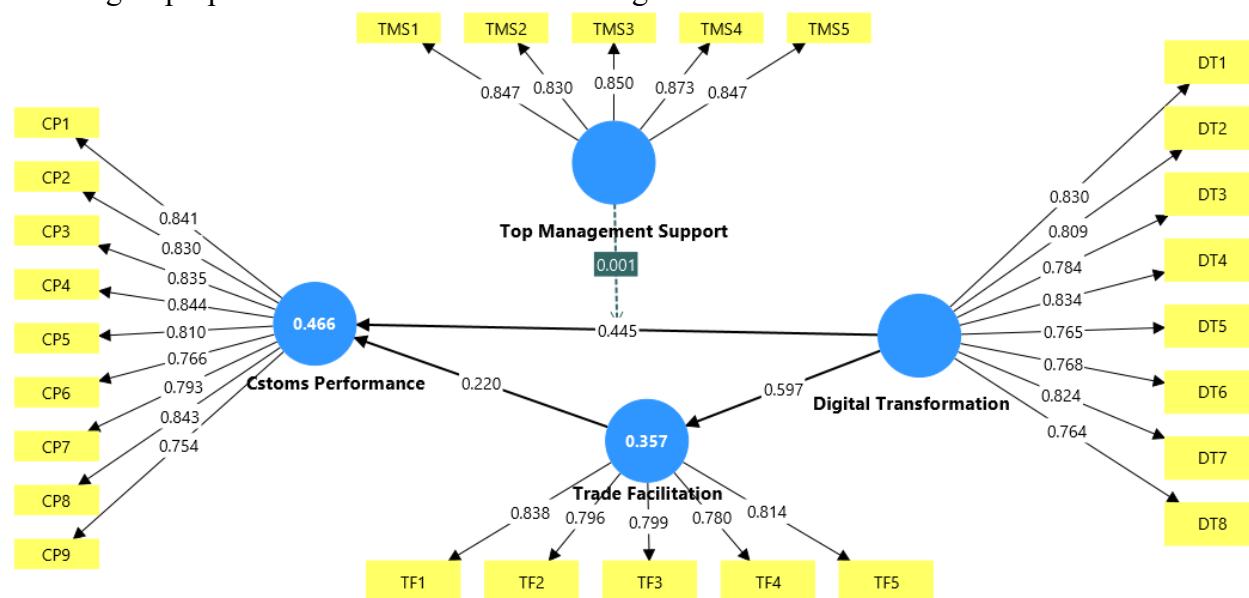


Figure 1. PLS Algorithm Results for the Measurement and Structural Models

Internal consistency and convergent validity were evaluated using Cronbach's alpha, rho_A, composite reliability, and average variance extracted. As presented in Table 2, all reliability coefficients exceed 0.70, ranging from 0.865 to 0.946, while AVE values range from 0.636 to 0.722 and therefore exceed the 0.50 criterion. These findings establish satisfactory reliability and convergent validity for all four constructs.

Table 2. Construct Reliability and Convergent Validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance

				extracted (AVE)
Customs Performance	0.936	0.937	0.946	0.662
Digital Transformation	0.918	0.920	0.933	0.636
Top Management Support	0.904	0.905	0.928	0.722
Trade Facilitation	0.865	0.865	0.902	0.649

Discriminant validity was first examined using the heterotrait-monotrait ratio. Table 3 shows that all HTMT values are below 0.85; the largest value is 0.675 between digital transformation and customs performance. The interaction construct also remains empirically distinct from the substantive constructs. The results therefore satisfy the conservative HTMT criterion for discriminant validity.

Table 3. Heterotrait-Monotrait Ratio of Correlations (HTMT)

	Customs Performance	Digital Transformation	Top Management Support	Trade Facilitation	Top Management Support x Digital Transformation
Customs Performance					
Digital Transformation	0.675				
Top Management Support	0.423	0.334			
Trade Facilitation	0.613	0.668	0.449		
Top Management Support x Digital Transformation	0.074	0.054	0.118	0.153	

The Fornell-Larcker assessment provides a second check of discriminant validity. As reported in Table 4, the square root of AVE for each construct, shown on the diagonal, is greater than its correlations with the other constructs. The measurement model thus meets the Fornell-Larcker criterion and provides adequate separation among customs performance, digital transformation, top management support, and trade facilitation.

Table 4. Fornell-Larcker Criterion

	Customs Performance	Digital Transformation	Top Management Support	Trade Facilitation
Customs Performance	0.814			
Digital Transformation	0.628	0.798		
Top Management Support	0.390	0.306	0.849	
Trade Facilitation	0.552	0.597	0.397	0.806

5.2 Explanatory Power and Effect Sizes

The model's explanatory power was assessed through R^2 and adjusted R^2 . Table 5 indicates that digital transformation, trade facilitation, top management support, and the interaction term jointly explain 46.6% of the variance in customs performance, whereas digital transformation explains 35.7% of the variance in trade facilitation. The close correspondence between R^2 and adjusted R^2 suggests that the estimates are stable and are not materially inflated by the number of predictors.

Table 5. Coefficients of Determination

	R-square	R-square adjusted
Customs Performance	0.466	0.461
Trade Facilitation	0.357	0.355

Effect-size results clarify the practical contribution of each predictor beyond statistical significance. As shown in Table 6, digital transformation has a large effect on trade facilitation ($f^2 = 0.554$) and a medium effect on customs performance ($f^2 = 0.236$). Top management support ($f^2 = 0.043$) and trade facilitation ($f^2 = 0.053$) have small effects on customs performance, while the interaction effect is negligible ($f^2 = 0.000$).

Table 6. Effect Sizes (f^2)

	Customs Performance	Digital Transformation	Top Management Support	Trade Facilitation	Top Management Support x Digital Transformation
Customs Performance					
Digital Transformation	0.236			0.554	
Top Management Support	0.043				
Trade Facilitation	0.053				
Top Management Support x Digital Transformation	0.000				

5.3 Predictive Relevance

Out-of-sample predictive relevance was evaluated using PLSpredict. Table 7 reports positive $Q^2_{predict}$ values for customs performance (0.426) and trade facilitation (0.351), demonstrating that the model predicts both endogenous constructs better than a naïve benchmark. The associated RMSE and MAE values provide transparent prediction-error benchmarks for future model comparisons.

Table 7. PLS-predict Results

	$Q^2_{predict}$	RMSE	MAE
Customs Performance	0.426	0.761	0.604
Trade Facilitation	0.351	0.809	0.657

5.4 Structural Model and Hypothesis Testing

Bootstrapping was used to assess the significance of the structural paths. Figure 2 shows that digital transformation significantly predicts trade facilitation ($\beta = 0.597$, $p < 0.001$) and customs performance directly ($\beta = 0.445$, $p < 0.001$). Trade facilitation also has a significant positive effect on customs performance ($\beta = 0.220$, $p < 0.001$), and top management support has a significant positive direct effect ($\beta = 0.166$, $p < 0.001$). In contrast, the interaction between top management support and digital transformation is effectively zero and nonsignificant ($\beta = 0.001$, $p = 0.969$).

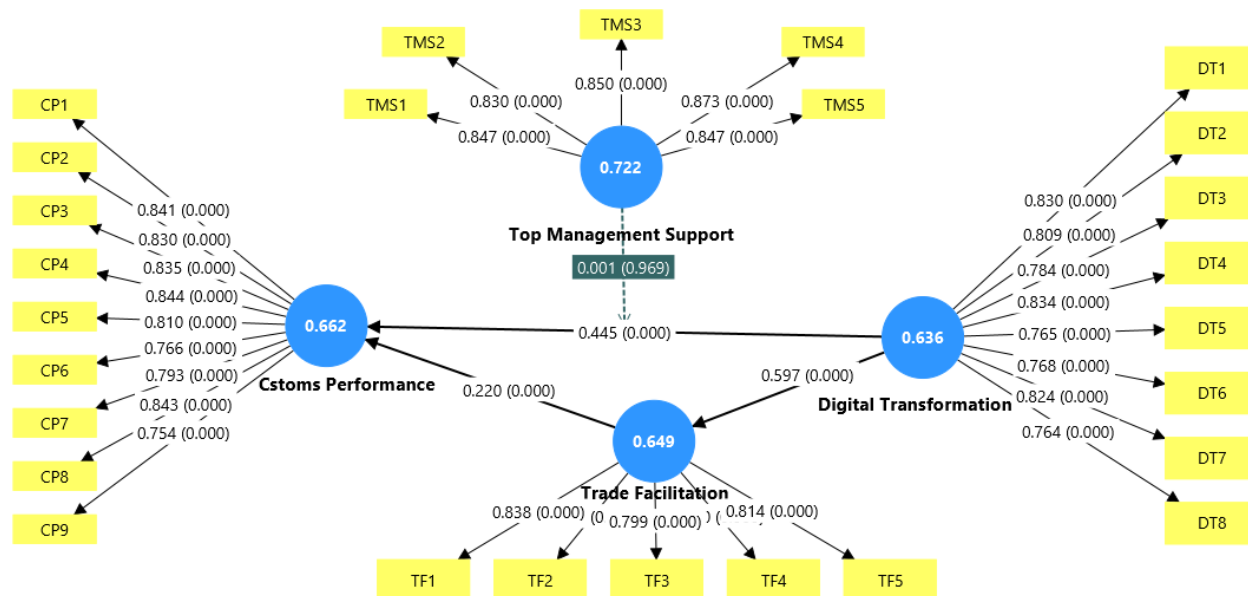


Figure 2. Bootstrapped PLS-SEM Structural Model

5.5 Mediation Analysis

The total indirect effect of digital transformation on customs performance is presented in Table 8. The effect is positive and statistically significant ($\beta = 0.132$, $t = 4.429$, $p < 0.001$), establishing that part of the performance benefit of digital transformation operates indirectly through an intervening mechanism. Because the model contains one mediator, this total indirect effect is identical to the specific indirect effect reported next.

Table 8. Total Indirect Effect

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Digital Transformation → Trade Facilitation → Customs Performance	0.132	0.132	0.030	4.429	0.000

Table 9 isolates the specific mediated pathway from digital transformation through trade facilitation to customs performance. The specific indirect effect is significant ($\beta = 0.132$, $t = 4.429$, $p < 0.001$). Since the direct digital transformation-customs performance path also remains positive and significant, trade facilitation exhibits complementary partial mediation rather than full mediation. H4 is therefore supported.

Table 9. Specific Indirect Effect Through Trade Facilitation

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Digital Transformation → Trade Facilitation → Customs Performance	0.132	0.132	0.030	4.429	0.000

5.6 Total Effects and Hypothesis Decisions

The total-effects estimates in Table 10 combine the direct and indirect influence of digital transformation on customs performance. Its total effect is 0.577 ($p < 0.001$), comprising the direct

effect of 0.445 and the indirect effect of 0.132. Digital transformation also significantly affects trade facilitation ($\beta = 0.597$, $p < 0.001$), while trade facilitation and top management support significantly affect customs performance. The nonsignificant interaction confirms that top management support does not strengthen or weaken the digital transformation-performance relationship in this sample.

Table 10. Total Effects

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Digital Transformation -> Customs Performance	0.577	0.578	0.036	16.181	0.000
Digital Transformation -> Trade Facilitation	0.597	0.599	0.032	18.549	0.000
Top Management Support -> Customs Performance	0.166	0.168	0.041	4.095	0.000
Top Management Support x Digital Transformation -> Customs Performance	0.001	0.001	0.037	0.039	0.969
Trade Facilitation -> Customs Performance	0.220	0.220	0.050	4.439	0.000

The findings support H1, H2, H3, and H4. H5 is not supported because the interaction coefficient is nonsignificant. Digital transformation improves customs performance directly and indirectly through trade facilitation; top management support contributes directly to performance but does not operate as the proposed moderator.

6. Discussion

The findings of this confirm that digital transformation is a core influencing factor for the work performance of the Jordan Customs Department. The digital transformation discussed here refers to various online customs clearance and data management technology systems developed and implemented by Jordan Customs, whose launch and operation have substantially driven the overall improvement of the customs department's work. Digital transformation exerts a significant direct effect on customs work outcomes, a conclusion that supports Hypothesis H2 and aligns with the findings of two prior studies: first, the conclusion proposed by Alwaelya et al. in 2024 that digital transformation can enhance strategic flexibility in Jordan's public administration sector; second, the conclusion put forward by Shubailat, Al-Zaqeba, Madi, & Khairi in 2024 that digital taxation and accounting tools can improve customs efficiency and strengthen port sustainability. This conclusion is not isolated; relevant previous studies have reached similar judgments, which perfectly echo the findings of the current research. The impact of digital transformation on customs work performance is moderate, meaning it is not only statistically significant but also delivers tangible benefits in operational efficiency, compliance, tax revenue protection, and service quality. In other words, it is not a weak correlation fabricated from statistical data, but a real asset to the daily work of customs; for example, it speeds up routine customs clearance procedures, ensures import and export enterprises can complete customs declarations in accordance with regulations,

safeguards the country's customs tax revenue from loss, and provides smoother services for all entities conducting business with the customs.

Turning to another set of conclusions: the strong effect of digital transformation on trade facilitation validates Hypothesis H1, further proving that electronic customs clearance, data interconnection and integration, and intelligence-based risk management can convert digital capabilities into simpler, faster, and more transparent customs clearance processes. Trade facilitation, in essence, refers to smoothing the process of cross-border goods entering and exiting customs, reducing unnecessary procedural bottlenecks. The set of findings in this study confirms that the first proposed hypothesis is valid: electronic customs clearance eliminates the need to submit paper materials in person at offline locations, relevant departments can interconnect and share data, and precise intelligence is used to identify risks for targeted inspections. These digital measures turn technical capabilities into benefits that ordinary practitioners can perceive: fewer customs clearance procedures, faster speeds, and a fully open and transparent process with no room for under-the-table operations.

This conclusion is consistent with the findings of Gkoni et al.'s 2024 study on global customs digital modernization, and it also aligns with the progress Jordan has made on trade facilitation-related indicators documented in the 2023 report of the United Nations Conference on Trade and Development. Not only does this result match the findings of international peer studies, but official reports released by specialized United Nations agencies also record that Jordan has been gradually improving its customs clearance facilitation, which fully aligns with the findings of the current research. The positive correlation between trade facilitation and customs work performance further supports Hypothesis H3, indicating that process-level outcomes are the key to obtaining institution-wide benefits. In other words, only by first streamlining and smoothing customs clearance procedures can the entire customs department secure tangible benefits; process optimization is the core intermediate step to achieving overall improvement.

For digital investment to generate practical impact, it must first reduce process barriers and improve the predictability of legitimate cross-border cargo flow, a conclusion that matches the constraints documented in studies by Ashour et al. and Samawi et al. in 2025. It is not the case that investing in digitalization will definitely produce value. These technological investments only generate real value if they truly solve the bottleneck problems in customs clearance procedures, enabling legitimate cargo for legitimate business to enter and exit the country more stably, without fluctuations between fast and slow clearance from one day to the next. This conclusion also fully corresponds to the various constraints encountered in Jordan Customs' digitalization process mentioned in the two previous studies. Digital transformation has a significant indirect impact on customs work performance, a result that supports Hypothesis H4, confirming that trade facilitation acts as a partial complementary mediating variable between digital transformation and customs work performance. Simply put, trade facilitation is not the only intermediate factor affecting the relationship between the two; digital transformation itself still directly influences customs work performance, but a considerable portion of its total impact is transmitted through the optimization of customs procedures.

This study supplements previous local Jordanian research by sorting out the specific mechanism through which technological investment is converted into organizational outcomes, with relevant citations of (Elhesenat et al., 2025; Zobi et al., 2023). Previous Jordanian peer studies only identified a correlation between customs' technological investment and the overall improvement of the department's work, but failed to clarify how the two are connected. The current study fills this gap and sorts out the underlying logical chain. For policymakers, this means that when evaluating digital technology projects, they must not only check whether systems have been implemented and their usage rates; they also need to assess whether customs clearance time, material burdens, process fluctuations, and stakeholders' sense of uncertainty have decreased—that is, they cannot only use surface indicators such as system launch rates as standards, but must

verify whether these tangible pain points have been resolved. Top management support has a significant positive direct effect on customs work performance, but the previously hypothesized moderating effect did not reach statistical significance, so Hypothesis H5 is not valid. Hypothesis H5 originally assumed that management support would affect the strength of the relationship between digital transformation and customs performance, meaning that the more management supports the initiative, the more benefits digitalization would bring, but the research results overturned this judgment. This distinction is theoretically critical: leadership input and resource support do improve the organization's overall work performance, but they do not alter the strength of the correlation between the core effect of digital transformation and customs work performance. In other words, management support can help the customs department perform better overall, but it will not increase or decrease the additional gains brought by digital transformation; the effect of digitalization itself is stable.

One possible explanation is that customs digital systems are already highly mature across the industry, so the performance gains from digitalization can be steadily realized regardless of the level of management support reported by the surveyed institutions. Another possibility is that in the sample of this study, the respondents' scoring range for management support was too narrow, preventing the study from detecting a significant interaction effect. This conclusion revises the hypotheses proposed by Alwaelya et al. (2024) and AL Afaishat et al. (2024), while suggesting that future research must distinguish between the "direct impact of management support on organizational performance" and "actual moderating boundary conditions", and must not conflate these two completely distinct effects. The explanatory power of the model constructed in this study is at a moderate level, meeting established criteria for predictive validity. This means the model can explain part of the variation in customs work performance and can be used to make reasonable predictions, though there remains a portion of variation that it cannot account for. However, the cross-sectional, self-reported design adopted in the study limits the ability to derive causal relationships and may carry the risk of common method bias. Cross-sectional design means all data are collected at the same time point, making it impossible to confirm the absolute causal relationship between digital transformation and improved customs performance; it can only prove that the two are correlated. Meanwhile, the self-reported model, where all data rely on staff members' independent completion of surveys, may also affect the accuracy of results due to consistent response biases. This study is exclusively focused on the Jordan Customs context, and there may be differences in the interaction modes between different stakeholder groups and customs digital services, which is another limitation of the research. That is, different groups that interact with customs, such as import and export enterprises and ordinary customs declarants, may have completely different experiences using digital services, and this study did not incorporate these differences into its analysis. Future relevant research should include long-term tracked operational indicators, multi-group comparative analysis, and adopt objective performance indicators such as customs clearance time, inspection pass rate, system availability rate, compliance rate, and user complaint volume, rather than relying solely on subjective self-reported surveys to conduct research. If this study can be replicated at customs departments of different border ports and different countries, it will clarify one question: in the early stage of digital promotion, or during periods when an organization is undergoing transformation, will management support become a more influential factor? That is, will management support in those special stages actually change the magnitude of gains brought by digitalization? The current study only measured the current situation of Jordan Customs and cannot answer this question.

7. Conclusion

This study focuses on the Jordan Customs Department, specifically exploring the correlation between the department's digital transformation and its work performance. To conduct an in-depth analysis of this relationship, the study sets two influencing variables: the first is trade facilitation, which refers to streamlining and simplifying cross-border trade customs clearance procedures,

used as an intermediary transmission medium to test whether digital transformation first acts on trade processes, and in turn drives the overall performance of the customs; the second is senior management support, which refers to the willingness of the customs' leadership to allocate resources and commit attention, used as a moderating factor to examine whether leadership support can amplify the benefits brought by digital transformation.

After obtaining the research data, several core direct impacts have been fully verified: first, the implementation of digital transformation by the customs can indeed directly promote the realization of trade facilitation and streamline cross-border customs clearance processes; second, digital transformation itself can also directly drive improvements in the customs' work performance; even when examined independently, trade facilitation consistently exerts a positive pulling effect on the institutional output of the customs. Beyond these direct effects, the study also confirms the existence of a significant indirect impact path, which indicates that trade facilitation is the core transmission channel, every investment the customs makes in digitalization does not generate value out of thin air; it is through this intermediary channel that practical value is ultimately created for the entire institution.

At the outset of the study, it was hypothesized that senior management support would play a moderating role, meaning that leadership support could amplify the effects of digital transformation, but this hypothesis was not supported by statistical data. However, one finding is unequivocal: senior management support itself has a significant direct positive effect on the customs' overall work performance. Two distinct conclusions can be drawn from these results: first, the resources controlled by the leadership and their commitment to investment can indeed improve the institution's work performance as a whole; regardless of other conditions, as long as the leadership is willing to provide support, the customs can perform better; second, contrary to previous expectations, the performance returns brought by digital transformation do not rely on the interaction between "senior management support" and "digital transformation" as assumed in the original research framework. This finding, which separates the two effects, clarifies the specific theoretical role of institutional supporting factors in the established digital customs environment, filling the previously unclear cognitive gap in this area.

In terms of the practical work of the Jordan Customs Department, the study also puts forward clear directions: first, continue to invest resources in several core areas, including interoperable electronic customs clearance systems, online accounting and taxation systems, data quality improvement initiatives, and intelligence-supported risk management systems. Moreover, when allocating these funds, investments must not be made blindly; every expenditure must be linked to measurable trade facilitation assessment indicators, and further advancement should only be pursued after confirming that process simplification outcomes have been achieved. Second, the customs leadership should shift their focus away from simply prioritizing the procurement of new technical equipment, and instead concentrate on the following priority tasks: redesign and streamline outdated and unsuitable processes, provide training for staff to help them meet the requirements of new work models, resolve collaboration bottlenecks with other relevant government departments, strengthen cybersecurity defenses to prevent system failures, and deliver stable and reliable services to all stakeholders that interact with the customs. Finally, the performance dashboards used by the customs to monitor work performance in real time should not only display technical operation metrics generated automatically by the system; these metrics must be integrated with actual business outcomes, including the time required for customs clearance, the stability of processes to avoid unforeseen issues, the effectiveness of customs inspections, the compliance status of the entire industry, the security of national tax revenue to prevent losses, and the satisfaction levels of all parties that engage with the customs, all of which should be incorporated into the dashboard for comprehensive monitoring.

Thus, this study presents an empirically validated explanatory model for small-scale countries whose national economies are primarily supported by trade. The study also proves a critical point:

simply adopting digital technology is not sufficient; digital transformation can only maximize its effectiveness when technical capabilities are converted into simpler and more stable border clearance processes. This research framework can also lay a foundation for future related studies; it can serve as a starting point for research that tracks changes in the same object over the long term, or compares situations across different regions; at the same time, it can provide a reliable reference for Jordan and other institutions with similar circumstances to the Jordan Customs Department to advance evidence-based customs modernization reforms.

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