



METHODOLOGICAL APPROACHES TO ASSESSING THE PERFORMANCE OF REMOTE ELECTRONIC CUSTOMS DECLARATION POSTS

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Article history:	Abstract:
<p>Received: 26th March 2026 Accepted: 24th April 2026</p>	<p>This study proposes an integrated methodological model for assessing the efficiency of Remote Electronic Customs Declaration (RECD) posts in Uzbekistan. The model combines process analysis, systems thinking, and functional-cost analysis to identify operational inefficiencies and improve decision-making. Based on national data and international experience from Singapore, South Korea, and Germany, the research highlights key bottlenecks and resource imbalances in customs procedures. The findings show that digital tools are not being fully utilized despite increasing workloads. The model's flexible structure allows its application not only in customs administration but also in other areas of digital public governance. Overall, the study offers a scalable and data-driven framework for improving institutional performance in the digital era.</p>

Keywords: customs administration, remote electronic declaration, process management, systems approach, functional-cost analysis, digital transformation, performance evaluation, BPMN, public sector efficiency, institutional reform.

INTRODUCTION

In the context of intensifying global trade, growing interconnectivity, and rapid digitalisation of public administration, customs systems have become increasingly important for national economic development and international trade facilitation. Modern customs services are no longer limited to control functions; they are also expected to support trade facilitation, economic growth, and institutional transparency. Within this framework, Remote Electronic Customs Declaration (RECD) posts represent an important innovation aimed at improving efficiency and reducing direct contact between declarants and customs officers.

RECD posts enable electronic processing of customs declarations from remote locations, eliminating the need for physical presence at border checkpoints. This system improves clearance efficiency, reduces corruption risks, lowers transaction costs, and enhances resource allocation. It is consistent with international standards promoted by the WCO, WTO, UNCTAD, and the World Bank, including TRS, LPI, and TFA frameworks.

In Uzbekistan, RECD implementation has become a key element of customs reform focused on speed, transparency, accountability, and digital transformation.

However, current performance evaluation methods remain largely descriptive, relying on indicators such as processing time and declaration volumes, which do not fully capture structural and systemic inefficiencies. This creates a methodological gap that limits effective decision-making and resource optimization.

Internationally, there is still a lack of comprehensive and practical models for assessing the multidimensional performance of remote customs systems. In response, this study proposes an integrated framework combining process analysis, systems thinking, and functional-cost assessment to provide a more holistic evaluation approach. The model supports both operational improvement and long-term institutional development. Overall, the study contributes to global discussions on digital governance by offering a practical and adaptable framework for evaluating RECD performance, particularly in developing countries undergoing customs modernization.

LITERATURE REVIEW

The evaluation of customs operational efficiency has become a key focus of both academic and applied research, particularly in the context of digital transformation and public administration modernisation. A wide range of methodological approaches has emerged in international and regional



literature, including quantitative efficiency assessment tools, structural diagnostics, and integrated management models.

From a regional research perspective, Russian and Central Asian scholars increasingly advocate for a shift away from rigid, indicator-driven models in favour of more flexible, process-oriented approaches. Bombin and Lichman (2023) argue that existing customs efficiency evaluation systems in post-Soviet countries suffer from indicator duplication and weak alignment with institutional objectives. They call for a transition to standardised process management models incorporating real-time monitoring and feedback loops [1]. Lebed et al. (2022) support this position, emphasising the role of digital tools in reducing human intervention and increasing transparency through platforms such as the New Computerised Transit System (NCTS). Similarly [2], studies by Abdullayev (2021), Tsoy and Ibragimov (2023) highlight persistent institutional constraints in the post-Soviet customs environment, including bureaucratic inertia, fragmented information systems, and low procedural automation.

Internationally, various quantitative tools are used to measure the effectiveness of customs operations and trade facilitation procedures. These include Data Envelopment Analysis (DEA), Principal Component Analysis (PCA), and composite indices such as the Logistics Performance Index (LPI) for cross-country comparisons. For example, Kilibarda, Andrejić, and Popović (2017) apply DEA to analyse logistics process efficiency, stressing the importance of service optimisation and digital infrastructure investment [3]. Institutions such as the World Bank and OECD provide macro-level data linking customs performance to trade costs, delays, and compliance with cross-border protocols [4]. UNCTAD also promotes a digital maturity model for customs administrations, highlighting training, systems compatibility, and process reengineering as key enablers of transformation.

However, many of these models fail to reflect the institutional specificities of transitional economies. In post-Soviet and Central Asian countries, performance constraints often stem not from technical deficiencies, but from fragmented governance, outdated IT systems, and inconsistent legal frameworks. Bratanov and Kozlova (2019), for instance, stress that the success of digital customs initiatives depends not only on technological readiness, but also on organisational flexibility and interagency cooperation. In Uzbekistan, early deployment of electronic platforms did not always ensure effective cross-agency coordination, revealing a gap between formal regulations and actual practice.

Expanding on this view, recent literature increasingly highlights the role of organisational readiness and human capital in customs modernisation. Mammadov et al. (2021) note that limited outcomes are frequently caused not by technical barriers, but by staff skill gaps, weak change management mechanisms, and inconsistent implementation of procedural innovations. In practice, this manifests as frequent manual overrides of automated systems, poor configuration of risk profiles, and high variability in decision-making. These findings underscore the need for comprehensive capacity-building programmes, including technical training and managerial development aligned with digital reforms.

Further attention is paid to legal and regulatory frameworks. In many developing economies, outdated customs codes and ambiguous enforcement rules hinder the integration of digital tools. Berdiev and Tashkentbaeva (2022), analysing Uzbekistan's customs system, show how legal inconsistencies undermine standardisation and create space for discretionary decisions that counteract automation goals. This suggests that digitalisation must be accompanied by legal harmonisation - including clear data governance rules, audit systems, and accountability mechanisms.

Modern research also explores the potential of emerging technologies in customs diagnostics. Tools such as process mining, artificial intelligence (AI), and digital twins offer new opportunities for workflow modelling, anomaly detection, and visualisation of inefficiencies. Chen et al. (2023) emphasise the benefits of integrating traditional management approaches with AI-driven analytics, particularly for predictive performance modelling. However, they also caution that successful implementation requires robust data infrastructure, cross-functional collaboration, and institutional support - conditions that are not yet widespread in many developing customs systems.

Local economist Sarmanov O. A., together with co-authors, conducted research on the impact of customs payments, exemptions, and preferences on the efficiency of foreign economic activity, as well as on the economic and statistical mechanisms for their assessment. The author emphasizes that customs privileges play an important role in expanding foreign trade turnover, stimulating investment activity, and supporting business entities. At the same time, the study substantiates the necessity of effective use of digital data, econometric analysis, and functional indicators in the customs sector. This approach also serves as an important theoretical and methodological basis for assessing the performance of Remote



Electronic Customs Declaration posts, as it enables the analysis of customs process efficiency through comprehensive indicators [8].

Sarmanov O. A., in his research, evaluated the economic factors affecting the efficiency of customs payment revenues in Uzbekistan through econometric analysis. The author emphasizes that import volume, customs tariff rates, and macroeconomic indicators have a significant impact on customs revenue collection, highlighting that the growth of import volume is a decisive factor in increasing customs revenues. In addition, the study develops scientific foundations for assessing and forecasting the efficiency of the customs system through statistical and econometric models. This approach is also important for evaluating the performance of Remote Electronic Customs Declaration posts, as it enables the analysis of the effectiveness of digital customs processes based on specific performance indicators [9].

Moreover, international experience shows that the success of digital reforms depends less on technology itself and more on the alignment between system architecture and institutional governance. For example, Singapore's TradeNet system is considered a global benchmark not only for its level of automation but also for its integration of regulatory control, risk management, and interagency coordination. Similarly, South Korea's UNI-PASS platform combines technological maturity with real-time analytics and professionalisation of staff, enabled by strong political will and inter-ministerial cooperation. In Germany, customs efficiency has improved through a hybrid model based on decentralised management and embedded monitoring tools integrated into public administration routines.

These cases demonstrate that implementing digital platforms alone is insufficient for successful customs reform; alignment of organisational structures, regulatory frameworks, and performance cultures is also essential. This approach aligns with theories of New Public Management (NPM), which emphasise transparency, accountability, and results orientation. However, critics of NPM point out that it overlooks systemic interdependencies and informal workarounds - features common to transitional contexts. In contrast, systems theory offers a more holistic perspective, stressing the importance of feedback loops, adaptability, and self-organisation in complex institutional systems.

As such, academic literature reflects ongoing tension between standardised performance indicators (e.g., KPIs, clearance times, transaction volumes) and more

context-sensitive, system-oriented approaches. While quantitative metrics offer comparability and clarity, they often mask structural inefficiencies, institutional friction, and decision-making asymmetries. As a result, more scholars now advocate for hybrid models that combine analytical and diagnostic tools - particularly in dynamic sectors such as customs administration.

Collectively, the literature points to three dominant methodological orientations in customs performance evaluation:

1. A process-based approach, promoting procedural standardisation and clarity;
2. Functional-cost analysis, identifying resource-intensive processes and enabling budget optimisation;
3. Systems thinking, uncovering hidden interdependencies between organisational units and workflows.

Despite the strengths of each, few studies offer an integrated framework combining all three, especially in relation to Remote Electronic Customs Declaration (RECD) posts.

This study seeks to address that gap by synthesising these perspectives into a single evaluative model. Unlike approaches focused solely on clearance times or compliance levels, the proposed methodology accounts for the complexity of digital customs administration - where outcomes are shaped by institutional structure, legal context, human capital, and technological integration.

In addition, increasing attention is paid to transitional dynamics. As Pollitt and Bouckaert (2017) note, the effectiveness of performance systems depends not only on what is measured but also on how measurement processes are institutionalised within governance culture. In rapidly reforming contexts such as Uzbekistan, this means that diagnostic tools must be flexible, iterative, and sensitive to both formal procedures and informal practices.

In conclusion, while extensive literature exists on customs efficiency and digital reform, many studies remain fragmented and disconnected from the practical realities of countries undergoing systemic transformation. This research builds on existing academic foundations and offers a context-sensitive, multi-method approach that blends international best practices with national constraints. In doing so, it contributes to the global digital governance agenda by advancing a methodological toolkit that combines analytical depth with practical adaptability - essential for sustainable institutional transformation in customs administration.

Institutional Context and Reform Background



The introduction of Remote Electronic Customs Declaration (RECD) posts in Uzbekistan in 2022 became an important step in the country's digital customs reform and public administration modernization. Initially, RECD posts operated under regional customs departments, allowing decentralized processing of electronic declarations. While this approach enabled rapid implementation and flexibility, it also created differences in technological capacity, staffing, and operational efficiency among regions.

Although the system improved declaration processing speed, digital traceability, and reduced congestion at customs terminals, the lack of unified standards led to procedural inefficiencies and uneven resource distribution. To address these issues, the government launched a new reform phase in 2025 aimed at integrating regional RECD units into a centralized Customs Clearance Center (CCC). The CCC model is designed to standardize customs operations, optimize workload distribution, and strengthen real-time monitoring and risk management.

This reform aligns with Uzbekistan's national digital strategy and international practices observed in countries such as South Korea and Kazakhstan. Therefore, the RECD reform represents not only a technological modernization process but also a broader institutional transformation focused on improving efficiency, accountability, and coordination in the public sector.

METHODOLOGY

This study employs an integrated methodological approach that combines process analysis, systems thinking, and functional-cost assessment (FCA), complemented by comparative benchmarking. The primary objective is to develop a diagnostic model for evaluating the operational efficiency of Remote Electronic Customs Declaration (RECD) posts within Uzbekistan's customs digitalization strategy.

ANALYSIS AND RESULTS

Process-Based Approach. The process-based approach was applied to identify, visualize, and analyze key procedures involved in customs declaration workflows. Standard processing stages at RECD posts-submission, verification, risk analysis, decision-making, and archiving-were modeled to detect bottlenecks and redundant operations. BPMN 2.0 notation was used to clearly represent decision points, distinctions between automated and manual actions, and parallel processes. This allowed for the identification of inefficiencies, including feedback loops, role duplication, and informal tasks.

Systems thinking was used to explore the interconnections between institutional elements: IT infrastructure, human resources, regulatory protocols, and interagency coordination. This enabled a deeper understanding of how systemic factors affect process execution and outcomes. For instance, delays in data exchange or divergent interpretations of risk profiles were examined as indicators of deeper ecosystem-level issues. A causal loop diagram was utilized to visualize these relationships (Figure 1).

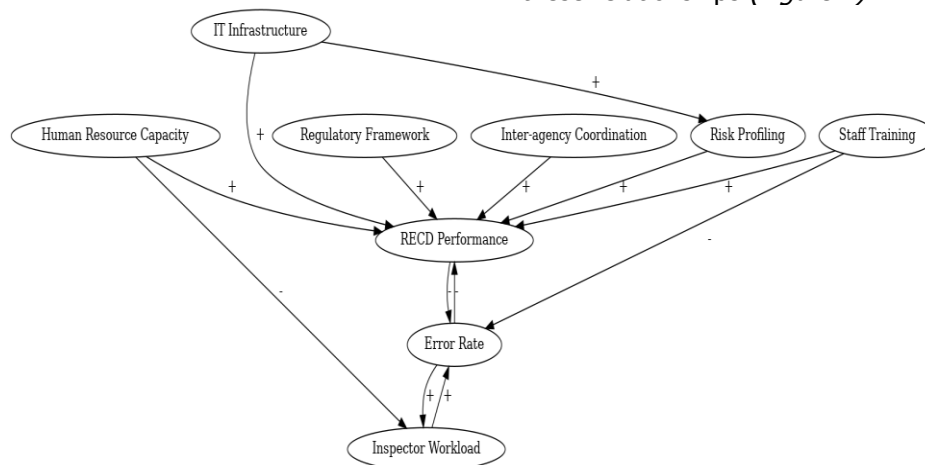


Figure 1. A causal loop diagram

Functional-Cost Assessment (FCA) was employed to detect non-value-adding activities, excessive resource consumption, and hidden inefficiencies in the allocation of staff time and use of digital infrastructure.

Each function was evaluated in terms of cost-efficiency and strategic contribution to customs objectives. High-cost, low-utility actions were flagged as candidates for automation or redistribution.



Benchmarking and Stakeholder Engagement

An additional layer of comparative analysis was integrated using publicly available datasets (World Bank’s LPI, OECD indicators, WCO reports, and national statistics). This enabled the benchmarking of Uzbekistan’s RECD performance against best practices from Singapore, Estonia, and South Korea, considering structural similarities, trade volumes, and reform trajectories.

The model also incorporated a stakeholder perspective. Given that efficiency depends on interactions between various actors-declarants, brokers, inspectors, IT staff, and supervisors-stakeholder mapping was conducted to identify influence paths and communication bottlenecks. This helped to detect behavioral patterns such as informal workarounds or misaligned communication channels that contributed to delays.

The methodology relied on a combination of qualitative and quantitative data: policy and regulatory analysis, expert sessions, internal statistics, and process visualization. Semi-structured interviews were conducted with RECD personnel, and performance indicators (e.g., processing time, error rates, workload levels) were collected. Triangulation was used to enhance reliability, while ethical principles-anonymity, confidentiality, and voluntary participation-were upheld.

Access to sensitive data was granted under a limited agreement with the Customs Institute.

The diagnostic model was tested using data from the Customs Clearance Center (CCC), one of the key RECD units operating within Uzbekistan’s digital reform framework. The CCC was selected due to its representativeness in terms of declaration volume, level of digital maturity, and strategic role within the customs system. Although a formal pilot across multiple sites was not conducted, the analysis allowed for the identification of core structural and procedural features common to the RECD environment.

For baseline analytics, Microsoft Excel was used for statistical processing (e.g., average processing time, rejection frequency, inspector workload), while Power BI was used for visual dashboards and bottleneck detection. Although not central to the research design, these tools enhanced the objectivity and clarity of the assessment.

The application of an integrated methodological approach enabled the development of a conceptual model for evaluating the performance of Remote Electronic Customs Declaration (RECD) posts. This model combines process mapping, system diagnostics, and functional-cost analysis, offering a multidimensional perspective for assessing operational efficiency within a digital customs environment.

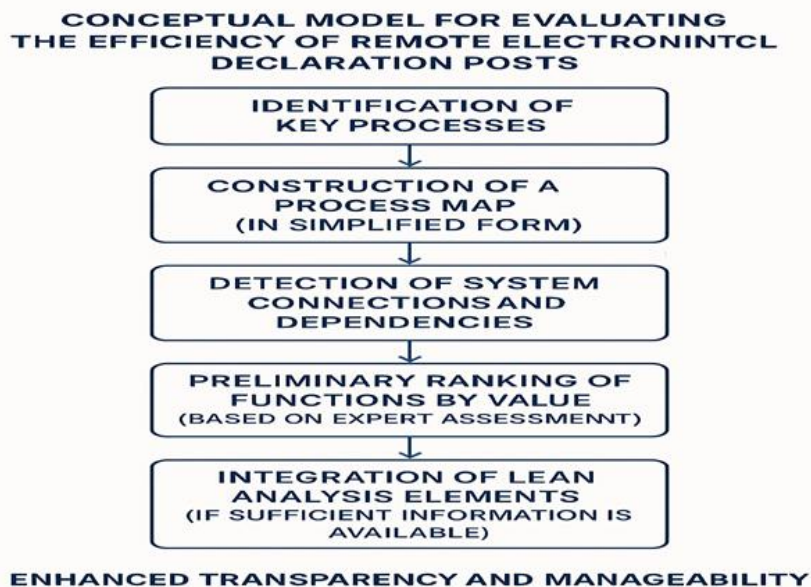


Figure 2. Conceptual Model for Evaluating RECD Post Performance

(A diagram integrating process-based, systems thinking, and lean approaches for assessment and managerial decision-making in customs administration.)

In practice, the model was implemented through the visualization of key procedural stages at RECD

posts. Process mapping revealed critical inefficiencies, particularly at the interface between automated risk analysis and manual verification. In several cases,



duplicated efforts and unclear decision pathways led to delays and increased inspector workload.

Empirical data from RECD operations in Uzbekistan showed a significant increase in the number of processed declarations—from 450–470 per day in 2022 to approximately 1,800 in 2025. As a result, the workload per inspector rose sharply: from 15–17 declarations daily to 35–42 by 2025. While this growth demonstrates the throughput potential of the digital system, it also indicates increasing pressure on human and technical resources, which may compromise accuracy and operational stability.

Time-based performance metrics revealed notable disparities across control levels. In 2025, the average processing time was 37 minutes for the green channel, 1 hour 46 minutes for the yellow channel, and 4 hours 38 minutes for the red channel. These figures indicate hidden delays and insufficient optimization, particularly in high-risk inspections and document verification processes. Despite digitalization, persistent time inefficiencies underscore the need for targeted automation and improved post-audit procedures.

Table 1.
Average Processing Time by Risk Control Level (2025)

Control Level	Average Processing Time
Green channel	37 minutes
Yellow channel	1 hour 46 minutes
Red channel	4 hours 38 minutes

Source: Internal statistics of the RECD Post, 2025

In addition, qualitative interviews with RECD personnel revealed hidden operational burdens associated with the sharp increase in volumes. Staff reported high levels of cognitive load due to multitasking, limited automation of routine tasks, and a lack of decision-support tools in real time. While digital interfaces reduced paperwork, they also introduced new demands for digital literacy, error management, and urgent coordination with external agencies. These findings highlight that technological upgrades, without workflow optimization, may simply shift the burden onto employees and constrain overall effectiveness.

Functional-cost analysis revealed an uneven distribution of resources across declaration categories. Some labor-intensive yet infrequent procedures consumed disproportionately high resources while contributing minimally to regulatory compliance. Their review-through automation or priority reallocation-could significantly improve cost-effectiveness.

Comparative analysis with foreign systems showed that Uzbekistan’s RECD posts perform strongly in terms of initial clearance times. According to World Bank data, average global customs clearance times are 6–7 days, whereas in Uzbekistan they are a matter of hours. However, examples from Singapore and Germany demonstrate that long-term success requires a combination of digitalization, Lean-based management, full system integration, and workforce development.

These findings affirm that digital platforms alone do not guarantee systemic efficiency. What matters is continuous process diagnostics, methodological rigor, and data-driven management. The model’s ability to visualize inefficiencies, identify institutional linkages,

and reallocate resources constitutes a strategic advantage for digital customs governance.

Nevertheless, successful implementation of the model faces several constraints: lack of data integration across agencies, employee resistance to change, and insufficient analytical units capable of conducting regular audits. Without institutional support and training, even the best model risks being undervalued or misapplied. Effectiveness depends not only on technology but also on a management culture rooted in learning and adaptation.

Looking ahead, the model could be embedded into national customs information systems as a process monitoring dashboard. By linking live data (throughput, channel distribution, deviations) with pre-set indicators, the system would provide managers with real-time insights and opportunities for operational optimization. The model may also serve as a foundation for policy reforms: it translates abstract efficiency criteria into understandable and actionable diagnostic indicators. This supports the development of agile policymaking, where reforms are adjusted based on feedback rather than imposed top-down.

Finally, the model aligns with modern trends in public administration: an emphasis on flexibility, data orientation, and stakeholder engagement. As digitalization expands—especially in customs and logistics—governments are expected not only to deliver services but also to improve transparency, accountability, and public trust. By combining classical and contemporary analytical tools, the RECD model helps advance these goals.



Moreover, the model can be adapted to other areas of public administration where procedural efficiency is critical - such as tax administration, licensing, or regulatory oversight. Its modular structure and absence of sensitive data make it suitable for scaling within broader digital reform agendas.

This study demonstrates that integrating systems thinking with functional-cost analysis can improve the efficiency and adaptability of Remote Electronic Customs Declaration (RECD) posts by identifying bottlenecks, reducing redundant processes, and supporting evidence-based management. The proposed model helps customs authorities shift from reactive control to proactive diagnostics, allowing operational problems to be addressed before they become systemic. It also supports process visualization, performance monitoring, staff evaluation, and institutional learning through targeted training and continuous improvement mechanisms.

The model has practical value not only for Uzbekistan but also for other countries implementing customs and public administration reforms. Its flexible and modular structure enables adaptation to different legal, technological, and organizational environments. Moreover, the model can be applied beyond customs administration to other digitalized public sector systems. However, the study has several limitations. It relies on aggregated operational data and lacks transaction-level analysis due to confidentiality restrictions. In addition, successful implementation depends on the technical capacity, analytical resources, and institutional readiness of customs authorities. Challenges such as fragmented information systems, limited interoperability, and human resource constraints may also affect implementation.

Future research should test the model in different customs environments, including both port-based and landlocked countries, to evaluate its flexibility and identify best practices for wider adoption. Overall, the model can serve not only as a diagnostic tool, but also as a driver of institutional modernization, promoting data-driven management and continuous improvement in public administration.

CONCLUSION

This study developed an integrated methodological model for evaluating the performance of Remote Electronic Customs Declaration (RECD) posts based on process analysis, systems thinking, and functional-cost assessment. In the context of Uzbekistan's digital customs reforms, the model helps identify operational inefficiencies, visualize process interconnections, and support data-driven managerial decisions.

The findings show that although RECD posts have improved declaration processing speed and throughput, several structural problems remain, including uneven workload distribution, delays in risk-based control procedures, and inefficient use of technical and human resources. The proposed model enables these issues to be detected through multi-level diagnostics and provides tools for internal auditing, benchmarking, and organizational improvement.

The study also emphasizes that effective digital transformation requires not only technological modernization but also institutional flexibility, continuous monitoring, and organizational learning. By integrating international standards and performance indicators, the model supports the development of a more transparent, accountable, and adaptive customs system. In addition, efficient customs administration contributes to reducing corruption, promoting fair trade, and strengthening public trust in state institutions.

Overall, the model offers a scalable and adaptable framework for evaluating RECD posts and other digital public administration units. It supports the transition from reactive management to proactive, evidence-based governance and contributes to the broader international discussion on improving public sector performance in the digital era. The author also recommends integrating the model into internal audit systems, digital monitoring platforms, and staff training programs to ensure sustainable institutional development and long-term administrative resilience.

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