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Assessing the Institutional, Technological, and Operational Challenges in the Implementation of Pakistan Single Window: A Mixed-Method Study of Trade Facilitation Reform in Pakistan

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ABSTRACT

Pakistan's cross-border trade has remained affected by lengthy documentation, manual procedures, weak inter-agency coordination, and delayed clearance processes. These problems have made it more expensive to do business and less competitive the Pakistani exporters and importers. To overcome these limitations, the Pakistan Single Window (PSW), created by the act known as the Pakistan Single Window Act, 2021 was introduced to facilitate these limitations through a single online platform to carry out importations, exportations, and transit-related documentation. The rationale of this study is anchored on the need to determine whether PSW has been able to effectively respond to the long-standing trade facilitation issues in Pakistan and what have been the institutional, technological and operational gaps that have continued to curb the effective implementation of PSW. The primary aim of the research is to investigate the necessity of PSW, evaluate the issues that impact its adoption, assess its initial role in enhancing trade in Pakistan, and finally recommend feasible solutions to increase its inclusion in the trade system of Pakistan. The study design is qualitative case study design which has been backed by descriptive quantitative data. Data were obtained based on secondary sources, such as the Pakistan Single Window Act, 2021, PSW (2024) and FBR (2024) reports, and World Bank Doing Business data, OECD Trade Facilitation Indicators, and UNESCAP report, and WTO Trade Facilitation Agreement documents, and international case information on TradeNet of Singapore and uTradeHub of Korea. Another source of information to gain the field level implementation experiences is brought by the stakeholder consultations with the Customs officials, the PSW related personnel, the traders and the logistics representatives. The results indicate that PSW has involved significant early improvements, which include automation of certain of the Licenses, Permits, Certificates, and other documents, reduction in duplication of documentation, increased usage of online payments, and better coordination between the Customs and the select Other Government Agencies. The reform however, is still incomplete since several of the OGAs are not fully integrated, some agencies still practice parallel manual processes, digital infrastructure in ports and border stations is still uneven and many of the small traders continue to be hampered by capacity and awareness issues.

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Another key technical challenge to the successful implementation is also identified as the interoperability between PSW and legacy system including WeBoC (2024) and agency specific databases. The study concludes that PSW is an inevitable and appropriate reform in trade facilitation; but its effectiveness requires more integration of institutions, but not development of platforms. To succeed in the future, it needs to make it mandatory that all the relevant agencies required to comply with it. It needs to impose tough rules on the sharing of data as this will be the only way that it can make it mandatory that all the relevant agencies required to comply with it. The international practice indicates that it only takes the legal authority, operational ownership, digital preparedness, and stakeholder confidence to move in unison to produce sustained outcomes in single window system.

Keywords:
Pakistan Single Window (PSW), operational gaps, World Bank, OECD Trade, TradeNet, uTradeHub.

1. INTRODUCTION

Pakistan's trade sector plays a vital role in the country's economic development as it has a major share in GDP (growth domestic product) employment and foreign exchange. Even though it's a promising idea, it's not as good in practice. The system fails due to ineffective processes, duplication of documentation and multiple layered regulatory control. As per the Ease of Doing Business 2020 report by the World Bank, Pakistan's position in the country's ranking is 108 out of 190 economies with a particularly poor score in 'Trading Across Borders' indicator (111th) which indicates high transaction costs, long clearance times, and cumbersome processes (World Bank, 2020). Such inefficiencies have been known for long as a hurdle to enhance export competitiveness and attract foreign investment (United Nations ESCAP, 2021).

Globally, reforms to trade facilitation have developed around streamlining and digitizing processes across the board to make trade faster, cheaper and more complex. The World Trade Organization's (WTO) Trade Facilitation Agreement (TFA), which came into force in 2017, commits member states to take measures that will enhance predictability, transparency and efficiency at the border (World Trade Organization, 2017).

In order to meet the dire need for a holistic reform tool, Government of Pakistan initiated Pakistan Single Window (PSW) in 2021. The legal basis for PSW was created by the Pakistan Single Window Act, 2021 which mandated the development of a digital platform that will allow all stakeholders in a cross-border trade (customs, other government agencies

(OGAs), financial institutions, and traders) to interchange data and documents electronically using a common interface (Government of Pakistan, 2021).

Pakistan's determination to implement PSW is consistent with the obligations under WTO TFA especially Article 10.4 which requires member states to provide or maintain single window for trade documentation submission (World Trade Organization, 2017). Successful implementation of PSW has the potential to improve Pakistan's international trade facilitation ranking, lower the cost of compliance for traders and enhance the country's attractiveness as a trading partner (OECD, 2022).

1.1. Statement of the Problem

Pakistan was ranked at 108th out of 190 countries in the World Bank's Ease of Doing Business 2020 rankings, and the country's score was particularly low on the indicator of "Trading Across Borders" (ranked at 111th of 190) because of high documentation, delays and lack of coordination between border agencies (World Bank, 2020). The Pakistan Single Window (PSW) was set up to try and cut these inefficiencies by digitising and simplifying trade procedures. Its realization is impaired, however, by a deficiency in inter-agency integration, low levels of digital infrastructure and low stakeholder capacity (United Nations ESCAP, 2021). The current research looks at the needs that will support the activity of PSW, the limits to the functionality of PSW, and vice versa.

1.2. Research Question

What are the critical institutional, technological, and operational challenges hindering the effective implementation of Pakistan Single Window, and how can strategic measures be adopted to ensure its seamless integration into Pakistan's trade ecosystem?

1.3. Objective of the Report

This report aims to:

a) Examine the rationale and necessity of PSW within Pakistan's trade context.

b) Assess and analyse the institutional, technological, and operational barriers affecting its implementation.

c) Evaluate its alignment with global best practices in single window systems.

d) Propose strategic and policy measures to ensure PSW's sustainable and effective integration.

1.4. Scope, Limitations, and Methodology

The report encompasses PSW legal framework, technical infrastructure, stakeholder experience, and impact assessment based on the available literature, the official report and case studies by the similar economies (Pakistan Customs, 2020). The main constraint is that there is not enough time. The report methodologically follows a mixed approach, with a qualitative analysis of the policy and institutional arrangements, which is complemented, where possible, by quantitative indicators, such as clearance times, cost savings and trade facilitation index scores (OECD, 2022).

2. LITERATURE REVIEW

The scholarly and policy literature is one-voiced in asserting the transformative power of single window system (SWS) in not only reducing the cost of trade transactions but also improving the effectiveness of the regulations. Pioneer applications such as Singapore's TradeNet and Korea's uTradeHub are usually proffered as global standards, and how institutional reforms allied to end-to-end digitalization efforts and political resolve managed to pare clearance down from days to hours, and to eliminate duplicative paperwork (Crimson Logic,1989.; UNCITRAL, 2019; World Bank, 2021). These systems evolved in terms of larger trade facilitation processes which proves these single windows work when they are integrated into national plans that are supported by a legal framework and resource.

The multi-economy surveys by UNESCAP illustrate that country level digital integration of customs, port authorities and regulatory bodies are not only associated with a reduction in time taken for clearance but also with increased transparency and keep the discretionary decision-making to a minimum (UNESCAP, 2023).Applicability of such experiences to Pakistan is particularly important given that despite multiple reform attempts, Pakistan's trade performance has been playing catch-up vis-à-vis its regional peers (World Bank, 2020; Pakistan Customs, 2022).

In line with the literature on Pakistan, the structural deficiencies always referred to in this basic study has been an impetus behind PSW being initiated. Several studies have also pointed out that fragmented border agency oversight, documentation requirements and lack of interoperability

have traditionally led to increased transaction costs, which act as a barrier to exports (World Bank, 2020; Pakistan Customs, 2022). This fragmentation at institutional level led to the creation of PSW as "a single, centralized and fully integrated national one-stop solution" aimed at aligning data exchange and regulatory procedures among over 70 agencies (GoP, 2021; PSW, 2023).

As per the literature available, the average clearances time at the major ports decreased from 120-144 hours to 60-84 and those that make payments online increased by 41% to 91%, according to PSWC's Pakistan Single Window Assessment (2024). The revenue performance review of FBR (2024) also relates the rise in Customs' revenues to automated value checks and under-invoicing. These results are consistent with international findings that single windows raise logistics performance and trade volumes (OECD, 2022; World Bank, 2021).

Meanwhile, literature reveals widespread issues that may undermine the effectiveness of PSWs. According to UNESCAP (2021), inter-agency coordination gaps and institutional resistance are some of the barriers that impede implementation and the OECD (2022) cites low digital literacy skills among SMEs to be a major hindrance to take-up.

3. RESEARCH METHODOLOGY

3.1 Research Design

The study is based on the exploratory qualitative-quantitative hybrid design. The exploratory dimension is very important since PSW is a recent reform and there is little empirical literature. The design enables the mapping of institutional, legal and technical frameworks with the parallel quantification of early performance metrics such as clearance times, documentation requirements and revenue gains. A cross-sectional approach was taken to obtain the status of the implementation of PSW as of 2023-2024 with the retrospective reference on the pre-PSW baselines (2019-2021) for a comparative analysis (World Bank, 2020; Pakistan Customs, 2022).

3.2 Data Sources

The study used both secondary data and limited primary qualitative input. The sources of secondary data were publicly available legal, institutional, policy, and international sources, including Pakistan Single Window Act, 2021, reports and operational statistics of Pakistan Single Window Company, policy documents and the reports on optimization of the data

collection procedure, as well as the observations of the process, were taken. There was limited primary input through informal key informant consultation with categories of stakeholders such as Customs officials, Pakistan Single Window-related personnel, trade representatives of the private-sector, and the logistics-sector stakeholders. In accordance with the ethics of conducting research, individual names and identities were not disclosed, and consultations were only used to get to know how the implementation was going, what kinds of bottlenecks were occurring, and what the stakeholders were seeing.

3.3 Data Collection Procedures

The data collection strategy involved two activities, which included documentary review and key informant consultations. The documentary review was based on laws, PSW (2024)/FBR (2024) reports, policy documents, trade facilitation indicators, and the international case studies. The key informant consultations focused on practical implementation issues, including OGA integration, digital documentation, clearance procedures, payment processes, system interoperability, and user-level challenges. The consultations were not treated as a statistically representative survey; rather, they were used to support and interpret the documentary findings. Data collection followed a three-stage structured documentary review process:

a) **Legal-Policy Review:** Relevant laws, statutory regulatory orders (SROs), and inter-agency agreements were reviewed to map PSW's legal architecture. This included the *Pakistan Single Window Act 2021*, customs rules, and integration agreements signed with OGAs.

b) **Institutional Reports and Technical Documents:** Annual reports, assessments, and progress evaluations by PSWC, FBR, and the Ministry of Commerce were extracted for operational metrics (e.g., system uptime logs, clearance time dashboards, LPCO issuance rates).

c) **Comparative International Literature:** Benchmark studies on mature single window systems from Singapore, Korea, and New Zealand were reviewed to establish performance standards and extract best practices relevant to Pakistan (World Bank, 2021; UNESCAP, 2021).

All documents were catalogued using a thematic coding framework, tagging them under legal, institutional, technical, stakeholder, and performance domains.

3.4 Operationalization and Measurement of Quantitative Variables

Operationalization of the quantitative variables used in this study was done with the help of the measurable trade facilitation indicators that are available in PSW (2024), FBR (2024), World Bank, OECD, and UNESCAP sources. Measurement of gains in efficiency was based on changes in average clearance time, number of documents required to transact a business, processing time of a License, Permit, Certificate and Other document, use of online payment and a decrease in repeated manual submissions. Comparison of these indicators was made between the pre-PSW baseline period and post-PSW implementation period wherever such like data were available.

Clearance time was calculated using hours or days spent on clearing consignments of compliant consignments before and after the PSW implementation. Documentation burden was quantified by using the average number of forms or documents that are necessary when making a trade transaction. The uptake of online payments was scaled (measured) based on the percentage of payments that was made online. Institutional integration was used to measure the number and status of Other Government Agencies integrated with PSW including the level of digital integration being full, partial or in-progress. The available FBR (2024) and PSW (2024)-related data on the trends in customs revenue, valuation checks, audit trails, and decreased misdeclaration were used to determine the revenue and regulatory gains. These indicators were studied on a descriptive basis using pre-post analysis, percentage changes, and interpretation of trends. The research does not postulate that all of the observed improvements were the result only of PSW, since the outcomes of trade facilitation could also be contingent on the level of trade volumes, exchange rate fluctuations, custom reforms, and the condition of the infrastructure.

3.5 Analytical Framework

An analytical tool that was used to organize the internal and external variables that influence the implementation of PSW was through a SWOT analysis. The internal dimension involved institutional strengths and weaknesses including legal support, governance, agency administrative autonomy, inter-agency coordination and digital capacity. The external dimension included opportunities and threats, such as integration of regional trading, digital transformation, donor assistance, cyber security

threats, financial limitations and political or infrastructural interference. Using SWOT analysis was not used in place of the thematic and quantitative analysis, but simply a way of presenting the key implementation conditions in a structured manner before negotiating the experiences and performance outcomes of the stakeholders. Analysis combined qualitative thematic analysis with quantitative trend analysis:

- Qualitative thematic analysis identified recurring challenges such as legal gaps, inter-agency resistance, and digital literacy barriers, drawing from content in PSWC's assessment reports, meeting minutes, and OGA integration evaluations (PSWC, 2024).
- Quantitative trend analysis compared pre- and post-PSW metrics: average clearance time, number of required documents, and customs revenue. For instance, PSWC (2024) reported average clearance time at Karachi Port declining from 120 hours (2019) to 60 hours (2023–24).
- International benchmarking was performed by mapping Pakistan's scores in the *World Bank's Trading Across Borders* indicator and the *OECD Trade Facilitation Index* against comparator countries that implemented single windows during 2005–2015 (OECD, 2023; UNESCAP, 2023).

This dual approach allowed triangulation: qualitative findings explained underlying causes, while quantitative data validated the extent of progress.

3.6 Comparative Benchmarking Criteria

Comparison of PSW and the TradeNet system (Singapore) and the uTradeHub system (Korea) were based on a selected number of benchmarking criteria that were provided by the international literature on the topic of single windows and trade facilitation frameworks. These criteria were legal and institutional requirement, the extent to which the agencies have been integrated, the extent to which the agencies have been automated, the extent of interoperability between the agencies and the customs and other regulatory bodies, the extent of user coverage and the extent of service delivery, the extent of risk management, the extent of coordination between the agencies and the customs and other regulatory and controlling bodies, its overall level of maturity in the facilitation of digital trade through the use of information technologies. Singapore and Korea have been chosen since both are mature and internationally recognized single window models whereas the PSW in Pakistan is still in

a staged implementation. The comparison was thus meant not to rank the systems per se but to report lessons of implementation not only relevant to the legal, institutional, technological, and operational context of the country of implementation, but also to other countries in similar contexts.

3.7 Reliability, Validity, and Limitations

To ensure reliability, only authenticated sources were included, and each dataset was cross-checked against at least one other independent source. Validity was enhanced through data triangulation across institutional, legal, and performance domains.

3.8 Ethical Considerations

The research primarily used publicly available documents as well as a few non-sensitive stakeholder consultations to learn implementation experiences. As the consultations were informal and did not imply any personal, confidential, or sensitive information, formal ethical approval was not needed. Nonetheless, ethical standards have been observed by anonymizing the identity of all consulted stakeholders and by not disclosing names, personal details or institutionally sensitive statements. The opinions gained during consultations were not reported as individually attributable results but were only used to gain an analytical interpretation. All the secondary data were well referred to and attributed to their origin in the APA 7th edition format.

4. RATIONALE AND NEED FOR THE PAKISTAN SINGLE WINDOW (PSW)

Pakistan has a long history of decades where its trade regime has been impacted by cumbersome manual processing and excessive documentation requirements as well as weak coordination of the border agencies (Pakistan Customs, 2020). Traditionally, traders were required to present different documents to various authorities, such as Customs, port authorities, quarantine services, and other government agencies. This overlap added compliance costs, as well as created delays, uncertainty, and discretionary decision-making (Ministry of Commerce, 2019). Institutional fragmentation was another root cause, with regulatory bodies more of a silo with limited information flow and weak harmonization of processes (OECD, 2022). This led to the clearance of goods that were normally taking several days to be cleared and the advanced trading economies were in a position to clear similar goods in much shorter time.

4.1 Legacy Issues in Cross-Border Trade

The trade regime in Pakistan has over decades suffered due to cumbersome manual processes and excessive documents requirements and the lack of coordination amongst border agencies (Pakistan Customs, 2020). Conventionally, merchants had to submit a collection of documents to various authorities, including customs, port authorities, and quarantine services, and other government agencies (OGAs), and usually in hard copy. This duplication led to increased compliance costs as well as caused delays, uncertainty and discretionary decision making (Ministry of Commerce, 2019). Another current issue was institutional fragmentation: regulatory bodies lacked information-sharing and the harmonisation of processes (OECD, 2022). As such, the goods clearance process could take several days or even weeks, whereas a few hours is foreseen in advanced trading economies (S. Afzal, personal communication, August 10, 2025).

4.2 Economic and Institutional Drivers for Reform

From the economic point of view, the necessity of PSW lies in the fact that Pakistan is economically dependent on its international trade for economic development and foreign exchange earnings (State Bank of Pakistan, 2023). The exports contribute nearly 10% of GDP, however, the growth has been restricted by high logistics cost, non-tariff and inadequate trade diversification (Pakistan Bureau of Statistics, 2023). Institutionally, Pakistan has signed up to the WTO Trade Facilitation Agreement (TFA) under which it is bound to implement measures such as single window to streamline documentation and border management (OECD, 2022). The Pakistan Single Window Act, 2021, gave a legislative mandate for integrating more than 77 OGAs into a single digital platform, and this is a step in addressing longstanding institutional coordination issues (WTO, 2017).

4.3 PSW in Global Context

International experience shows that well implemented single window systems provide significant benefits in terms of trade facilitation. Singapore's TradeNet, which had been launched in 1989, managed to cut the trade clearance time from several days to less than 10 mns (Singapore Customs, 2020). Korea's uTradeHub unites more than 40 public and private sector agencies, and facilitates complete paperless trade (Korea Customs Service, 2021).

In the South Asian context, however, single window adoption has been slow and most countries are still using partially automated customs systems. Pakistan's PSW has the potential to become a regional leader, provided it is effectively implemented using lessons learned from the best practices across the globe. (I. Sohail, personal communication to be noted on August 11,2025). By placing PSW in this global course of reform, Pakistan can not only meet its WTO commitments, but can also enhance its competitiveness in the international market (S. Afzal, personal Communication, August 10, 2025).

4.4 Legal and Institutional Framework of PSW

The PSW has a legal and institutional framework under which it is operating and this is the basis from which its success is derived. Without a solid legislative basis and clear governance mechanisms, the PSW would run the risk of being an uncoordinated or underused platform.

4.4.1 Pakistan Single Window Act, 2021

The Pakistan Single Window Act, 2021 was passed through the Parliament to provide a statutory framework to the PST, which makes it a binding system for information exchange related to trade between all the stakeholders (GoP, 2021). The Ordinance for the Creation of PSWC, 2021 officially approves the creation of PSWC, a public sector (governmental organization) company limited by guarantee at the administrative control of Pakistan Customs (FBR, 2024).

Key objectives of the Act include:

- Designing a unified electronic portal for submission, processing and dissemination of trade related information to all concerned government agencies (OGAs) and stakeholders in the private sector.
- Ensuring compliance with WTO Trade Facilitation Agreement (TFA) obligations, particularly Article 10.4, which mandates the establishment or maintenance of a single window system.
- Promoting paperless trade by enabling secure electronic submission, processing, and storage of documents, thereby reducing reliance on physical paperwork (WTO, 2017).

The Act applies to all OGAs participating in international trade, including customs authorities, port authorities, quarantine authorities, plant and animal health authorities and certification authorities, and makes their involvement in PSW mandatory. Importantly, it also provides the powers

to the PSWC to establish procedures for operation, standards of service, and technical procedures for data exchange (PSW, 2022).

4.4.2 Governance Structure

The governance model of PSW is based on the principle of the balance between policy control and operational autonomy. At the apex is PSWC Board of Directors which is responsible for strategic direction, policy approval and monitoring of implementation progress (PSW, 2023).

The governance structure typically includes:

- **Chairperson**: Usually the Chairman of the FBR, ensuring alignment between customs operations and PSW development.
- **Board Members**: Representatives from key ministries (Commerce, National Food Security, Maritime Affairs, IT & Telecom), private sector trade bodies, and technical experts in ICT and trade facilitation.
- **Chief Executive Officer (CEO)**: Responsible for day-to-day management, technology deployment, stakeholder coordination, and capacity building initiatives.
- **Special Committees**: Tasked with areas such as risk management, legal compliance, ICT architecture, and stakeholder engagement (Ministry of Commerce, 2022).

The PSWC has the administrative freedom to hire, contract, and procure. This allows it to recruit technical talent and manage vendor relationships with less red tape than it has (OECD, 2022)

4.4.3 Subscription and Compliance Mechanism

A key PSW operating aspect is the subscription model that regulates the accessibility of traders, customs brokers, freight forwarders, suppliers, and others with the platform and its usage. As per the Pakistan Single Window Act followed by the Subscription Rules, all organizations engaged in cross-border trade must register with the PSWC (PSW, 2022).

a) Registration Process

- Online Application through the PSW portal, providing organizational details, national tax number (NTN), and relevant licensing information.
- Verification by PSWC against existing government databases (e.g., FBR's tax records, SECP company registry).

- Approval and Activation with issuance of secure login credentials.

b) Fee Structure

- The majority of small traders register for free because the basic registration is free although premium services like expedited processing of documents subscription fee for enhanced data analytics or integration of the system with ERP may be charged (State Bank of Pakistan, 2023).

c) Compliance Obligations

- All registered users must submit trade documents through PSW in prescribed electronic formats.
- Non-compliance (e.g., bypassing the system, submitting incomplete data) may result in penalties under the PSW Act or even suspension of trading privileges.
- OGAs are required to process applications received through PSW within set service-level agreements (SLAs), improving predictability for traders (Ministry of IT & Telecom, 2023).

d) Data Security and Privacy: As per Pakistan Telecommunication Authority (2022), the Act has the provisions for safe data exchange as per Pakistan's Electronic Transactions Ordinance (ETO) 2002 and international standards such as ISO/IEC 27001. The user information is encrypted while being transferred and stored and access to the user is guided by MTA.

4.5 Functional Architecture of the PSW System

The design of the PSW system owes to an effort to modernize trade by integrating multiple fragmented processes into a unified and digital infrastructure. Its architecture consists of three shared elements, technical infrastructure, digital services and interoperability mechanisms that all play a pivotal role to ensure efficiency, resilience and scalability.

4.5.1 Technical Infrastructure

PSW is set up in a cloud-enabled, tier-III data centre with a separate Disaster Recovery (DR) site, so that it offers strong availability and business continuity (PSW, 2023). The application layer of the system is a microservices-based application layer that can be deployed in a modular way. An Enterprise integration layer featuring API gateways and an Enterprise Service Bus (ESB) is used to integrate PSW with systems

belonging to Customs, financial institutions, regulatory bodies (OGAs), and logistics partners (UNESCAP, 2021). Meanwhile, a central trade data base stores, collects and logs declarations, permits and transactional data. In FY 2023-24, PSW had processed 71% of all trade transactions in Pakistan supporting more than 80,000 subscribers and has completely eliminated 155 paper-based documents (PSW, 2024).

Table 1

Impact Metrics, Pre-PSW vs. Post-PSW (FY 2023–24)

Indicator	Pre-PSW (2019)	Post-PSW (2023–24)	Improvement
Average Clearance Time (Imports)	~122 hours	~68 hours	–44%
Number of Documents per Transaction	~12	~6	–50%
Subscribers	,	Over 80,000	New
Trade Coverage via PSW	,	71% of total trade	High

Note: Pakistan Single Window Annual Report FY 2023–24; PSWC update brief.

The infrastructure has end-to-end encryption, multi-factor authentication (MFA) and role-based access control following the national cybersecurity framework (Ministry of IT & Telecommunication, 2022). Readiness for peak loads: Load balancing, auto-scaling features help in being ready for peak loads, especially in the festive period of trade surges (IBM, 2023). System resilience is based on daily system backups and regular DR drills.

4.5.2 Digital Services

PSW's digital service layer replaces numerous manual processes with efficient, standardized workflows:

Figure 1

Digital Service Layer

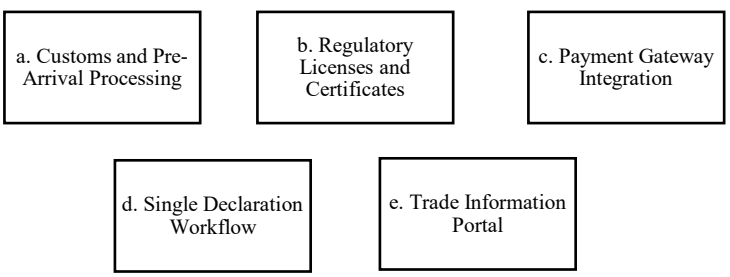
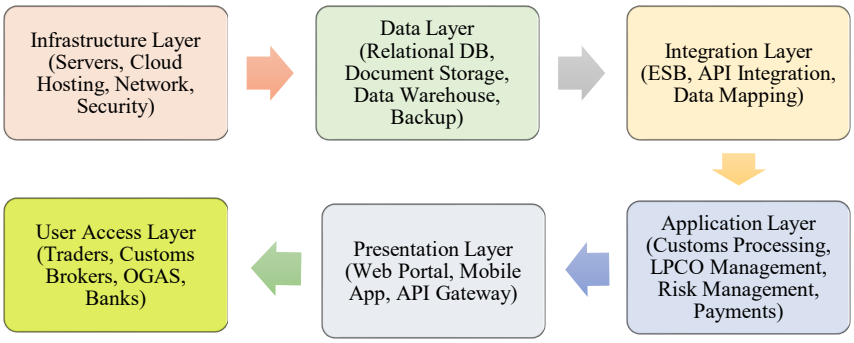


Figure 2
PSW Architecture Overview



4.5.3 Interoperability and Data Sharing

Interoperability is the key to PSW's success. It is utilizing WCO Data Model standards to harmonize declarations, permits, and risk alerts between agencies and remove duplicate data entry (World Customs Organization, 2022). Stakeholders in the private sector, such as banks and the shipping forwarders link though secure APIs for various functions, such as payment validation and tracking of containers in real time (International Chamber of Shipping, 2023)

5. FINDINGS

5.1 Institutional Readiness and Governance of PSW

This section provides a SWOT analysis of the PSW implementation to structure the key internal and external factors that influence the reform. The strengths and weaknesses are internal institutional and operational factors within the PSW system, and the opportunities and threats are external policy, technological, economical, and governance-related factors that can impact future performance. The analysis will assist in establishing whether PSW has already established a strong foundation and whether additional reforms are necessary to enhance the coordination, adoption, infrastructure, and long-term sustainability.

5.1.1 Institutional Strengths, Weaknesses, Opportunities and Threats

Strengths

a) Strong legal support which guarantees obligatory participation.
b) Governance model includes representatives from the public and private sectors, in order to ensure stakeholder, buy-in.

c) Administrative autonomy of PSWC enables it to make decisions faster than traditional bureaucracies.

Weaknesses

a) Over Centralization - Over reliance on FBR/Customs leadership may lead to over-centralization.

b) The level of inter-agency coordination is still a work in progress and some OGAs are slow to follow.

c) There is a need for increased digital literacy for small traders in order to guarantee fair access (World Bank, 2021)

Opportunities

a) PSW initiative aligns Pakistan to be more deeply integrated in global and regional supply chains as per the goal of WTO Trade Facilitation Agreement (TFA) and the model of interoperability between the Asian Economic Cooperation (AEC) + Southeast Asia (ASEAN), 2019 + South West Asia (SWA) (World Trade Organization, 2017; UNESCAP, 2021).

b) Digital transformation that is ongoing in the National E-Governance Framework and the digital payment reforms of the State Bank of Pakistan provide a solid base for scaling PSW in the borders and inland trade transactions (State Bank of Pakistan, 2023; Ministry of IT & Telecom, 2023).

c) The fact that Pakistan is included in international trade facilitation programs such as "Single Window Systems and Regional Integration" of the World Bank paves the way for technical assistance, donor partnerships and regional data-sharing agreements (World Bank, 2021).

d) The growing international demand for transparent and paperless trading systems to improve the global competitiveness of Pakistan as a sign of conformity with international norms of traceability, digital documentation and security (OECD, 2022; World Customs Organization, 2022).

e) The increasing use of blockchain and artificial intelligence (AI) based risk profiling of customs are globally offering the future for PSW to incorporate emerging technologies that can be used to enhance audit accuracy and predictive analytics (WTO, 2023; McKinsey & Company, 2022).

Threats

a) Continue to face institutional resistance of OGAs not fully integrated coupled with bureaucratic inertia, that continues to be the biggest hindrance to full-fledged implementation of PSW (UNESCAP, 2021; Ministry of Commerce, 2023)

b) Inadequate cybersecurity preparedness exposes PSW to potential data breaches, system downtime or cyberattacks posing potential compromises to the user confidence and flow of trades (Ministry of Information Technology & Telecommunication, 2022)\

c) High upfront expenses of infrastructure modernization and recurring maintenance needs may become unviable under fiscal pressure, especially when considering the macroeconomic volatility that Pakistan has experienced in recent times (IMF, 2024; World Bank, 2023).

d) The digital divide between large traders is at risk of growing due to less digital capacity among SMEs (2023), which will lead to a lack of inclusivity and lower level of adoption in far-flung regions (OECD, 2023; Pakistan Business Council, 2022).

e) Exogenous shocks like political instability, energy supply shortages or disruption in the international logistics could disrupt the implementation timelines and reduce the perceived effectiveness of the reform (Transparency International Pakistan, 2024).

5.2 Stakeholder Roles and Implementation Experiences

5.2.1 Customs and the PSW Operating Entity

Pakistan Customs continues to be the key regulatory agency for cross border trade and its mandate to lead, guide and facilitate implementation of Single Window nationally is formalized under the Pakistan Single Window Act, 2021 (Government of Pakistan, 2021). In operational terms, Customs is the lead enforcement and policy authority which will ensure that all processes related to digital trade are compliant with the domestic regulations and Pakistan's obligations under the WTO Trade Facilitation Agreement (TFA). The working relationship between Customs and the PSW-OE is established by formal agreements, including a multi-year service and performance model which provides measurable goals for integration, down-time levels, cybersecurity procedures and transaction numbers. For example, the target of the 2023-2024 operational plan is 98% uptime of the system, 20 new OGAs, and bring the average clearance time

from 104 hours to 72 hours for compliant consignments (Pakistan Customs, 2023).

Table 2

Customs–PSW OE Governance and Operational Structure

Role/Entity	Core Function	Integration Responsibility
Pakistan Customs	Lead enforcement, regulatory compliance, border management	Policy alignment, OGA enforcement, risk management
PSW Operating Entity	System development, technical operations, stakeholder onboarding	API integration, user support, cybersecurity
Joint Implementation Committee	Oversight, coordination, milestone tracking	Ensures cross-agency accountability
PSW Technical Team	Software design, API development, testing	Platform stability and service delivery
Customs Field Offices	Physical inspection, user interaction at ports	Feedback loop to PSW-OE

Note: *Pakistan Single Window Annual Report FY 2023–24; PSWC update brief.*

However, the adoption of the field level has not been smooth. A PSW-OE survey taken from 147 Customs officers in Karachi, Lahore and Islamabad in late 2023 reported that out of 147, 41% respondents rated their digital readiness as "basic", whereas only 18% rated themselves as highly competent to navigate and troubleshoot the systems (PSW, 2023). To fill this gap, Public Service Web-OE has launched multi-tiered capacity building programs through e-learning modules, workshops and live hotlines available 18 hours a day.

5.2.2 Other Government Agencies

The PSW is intended to be a single digital gateway connecting all the agencies involved in import, export and transit operations. Pakistan's trade regime involves more than 70 OGAs including regulatory bodies, inspection and certification bodies dealing with issuing of Licenses, Permits, Certificates amongst others (LPCOs). These include, for instance, the Drug Regulatory Authority of Pakistan (DRAP), the Animal Quarantine Department (AQD), which have distinct mandates but similar data requirements (O. Qasmi, personal communication, September 29, 2025).

Integration in this case generally includes the development of custom APIs to enable the real-time exchange of LPCO data between agency

databases and PSW platform. Agencies such as DRAP and Ministry of Narcotics Control have adopted digital transformation and have completely automated their licensing process. Others, like the Pakistan Standards and Quality Control Authority (PSQCA), have been repeatedly lagging due to inadequate IT infrastructure, lack of internal process digitization and resistance from staff who are used to manual systems (S. Afzal, personal communication, August 10, 2025).

The Animal Quarantine Department, for example, still issues parallel paper-based health certificates in spite of having a functioning PSW integration. According to an internal PSW-OE evaluation, this "double handling" results in an average delay of 2.5 days for livestock-related shipments in the clearance time. In comparison, the Ministry of Narcotics Control has reported 80% faster issue of no-objection certificates (NOCs) since full digital migration, which is the kind of efficiency gains that can be had when integration is embraced.

Table 3

Status of OGA Integration (as of June 2024)

Agency Name	Integration Status	Average Processing Time Pre-PSW	Average Processing Time Post-PSW	Key Challenges
Drug Regulatory Authority of Pakistan	Full	10 days	4 days	Minor API bugs
Ministry of Narcotics Control	Full	7 days	1.5 days	None significant
Pakistan Standards & Quality Control Auth	Partial	8 days	6 days	IT infrastructure gaps
Animal Quarantine Department	Full (dual process)	12 days	9.5 days	Resistance to automation
Plant Protection Department	In Progress	15 days	N/A	Data standardization issues

Note: Pakistan Single Window Annual Report FY 2023–24; PSWC update brief.

Early adopter OGAs boast of great advantages: They consist of less physical activity in offices, fewer cases of unnecessary data entry, faster inter-agency clearances. Nevertheless, until the entire range of 70+ OGAs are fully integrated, the PSW cannot impact to its full maximum effect.

5.2.3 Banks and Financial Institutions

The PSW ecosystem cannot be achieved without banks and other financial institutions because of the financial connectivity they can provide as secure trade settlements, customs duties and other payments. Among the large operation improvements include the removal of the delays in payment reconciliation which in the past contributed to the shipment clearance lag of up to 48 hours. The data of Electronic Import Form (EIF) and Electronic Export Form (EE) which once could only be submitted manually to SBP designated offices are also facilitated by banks. Automating these processes with the help of PSW can reduce the errors, enhance the transparency and the possibility of fraud. However, challenges still persist such as non-unity implementation of API standards across banks, occasional system hacking resulting in payment confirmations' failures and more robust cyber-security protection for sensitive trade finance data (M. Naqi, personal communication, September 25, 2025).

The SBP and PSW are currently working on integration of blockchain-based trade finance modules to enhance transparency in the processing of Letters of Credit (LC) and mitigating the risk of double financing which is inspired by the model of the Singapore Networked Trade Platform (NTP).

5.2.4 Traders and Customs Agents

Traders, Freight forwarders and Licensed customs agents are the major end users of the PSW platform and their involvement is crucial to the success of the system. The PSW gives them the ability to send the needed documents such as commercial invoices, packing lists, certificates of origin, and import/export permits electronically through one interface. This is a major departure from the pre-PSW environment, wherein the traders needed to physically contact various agencies, sometimes in different locations, leading to delays and increased transaction costs.

According to the PSW User Experience Survey 2023, more than 68% of traders reported a drop of at least one working day in clearance time and 54% reported a drop in out-of-pocket costs being incurred in the documentation and travel aspects (M. Naqi, personal communication, September 25, 2025). However, adoption issues still remain. Some traders still use handwritten documentation as a result of their limited digital literacy, while customs agents have also complained of system downtime

and occasional discrepancies between data they are required to submit and agency requirements.

5.2.5 Additional Stakeholder Perspectives

While the preceding sections of the paper have concentrated on the experiences of Customs, OGAs, banks and traders, there are several important stakeholder groups which are underrepresented in the discourse on the implementation of PSW. Their views are key to gaining a fuller picture of the opportunities and threats to the system.

a) Small and Medium Enterprises (SMEs) and Border Traders: SMEs, which make up most of the exporters of Pakistan, are among the groups that are most negatively affected by this situation as it is difficult for them to adapt to PSW. Most of them have limited resources, low digital literacy, and manual processes or informal brokers to ensure compliance (World Bank, 2020). At smaller land borders, micro-traders face other barriers such as lack of internet connectivity and high costs of compliance compared to the volume of trade. Their inclusion in PSW is of vital importance for inclusive trade facilitation, but needs special support mechanisms, such as training programs and reduced user interfaces (UNESCAP, 2021). Alibaba.com has also initiated SME Elevate, a joint program with PSW to train and empower SMEs by providing them with the necessary skills, knowledge, and resources to successfully enter international markets (S.Afzal, personal communication, September 25, 2025).

b) Logistics Service Providers and Freight Forwarders: In cross-border trade, logistics companies and freight forwarders can be regarded as the connective tissue, as they deal with documentation, coordination and physical movement of goods. Their function to induce compliance with the PSW processes is essential. A further integration would provide an efficiency improvement across the supply chain (M. Masood, personal communication, August 10, 2025).

5.3 Efficiency Gains and Trade Facilitation Outcomes

5.3.1 Efficiency Gains

The essence of national single window is efficiency: fewer touchpoints, fewer paper documents, and quicker, more predictable release and clearance of goods. PSW's own independent assessment, conducted by Ipsos/Reenergia using the UN/CEFACT Single Window Assessment Methodology, documents statistically significant time and cost reductions

reported by traders and customs brokers after the platform's rollout, alongside qualitative gains in transparency and predictability (PSW, 2024).

a) Clearance time: The most impactful channel during seaports (Karachi Port Trust and Port Qasim, including terminals such as QICT) has been advance processing of incoming declarations with automated routing of declarations and LPCO applications to the concerned agencies. User experiences from adopting digital and biosecurity processes the user experience in goods declaration (GD) and associated OGA clearances changed from a process that used to take many days of paperwork, to one in which compliant shipments got clearances on the same or next day subject to the risk rules. The user survey of the PSW Assessment shows that a clear majority reported at least one day saving of end-to-end processing time, but many 1-2 days saving depending on commodity and involvement of OGA (PSW, 2024). On the air side (Karachi and Lahore), these advantages can be increased by airlines having earlier data availability and shorter dwell times; declarants routinely claimed to have sub-24-hour turnarounds for green lane consignments where there was no physical exam. The most heterogeneous borders are those at land (which include Torkham): the integration of transit, the availability of scanners, and the constraints imposed by local infrastructure make the benefits real but more uneven than in the sea/air gateways (PSW, 2025).

b) Documentation and transaction costs: A major efficiency channel is the reduction of duplicative paperwork. PSW's "single submission, multiple processing" approach eliminates redundant entry of common data across customs, plant and animal health, narcotics control, standards/compliance bodies and banking. The Assessment found that the share of online payments jumped from 41% to 91% after PSW went live, which directly cuts bank-visit costs and reconciliation delays (PSW, 2025). Traders also reported lower courier and liaison costs as physical file movement, and the "follow-ups" (PSW, 2024).

c) Regulatory processing time (LPCOs): The automation of LPCO workflows, notably for Department of Plant Protection (DPP), PSQCA, the Ministry of Narcotics Control and DRAP, has shortened queueing and reduced back-and-forth queries by anchoring applications in a shared data dictionary and business rules (Integrated Tariff/Integrated Risk Management) (PSW, 2024).

d) Case illustrations: At Karachi Port/QICT, traders highlighted that e-payments and auto-notifications removed the classic "lost day" between duty payment at bank and system updating; with PSW, bank confirmations post electronically in near real time, permitting same-day terminal moves for compliant boxes (PSW, 2024).

e) Benchmarking internationally: The result of the PSW Assessment in the "Trade Facilitation Score" (express analysis) places Pakistan at a rough score of 71, slightly below several adopters in the ASEAN (2019) region during their early single-windows phase, and just ahead of the pre-reform baselines of the South Asian peer.

f) Quantifying the gains: One of the enduring problems is the fact that no single publicly available dataset releases hour by hour dwell time series in all nodes in Pakistan. The PSW Assessment, rather, triangulates the user-reported hours/days, system logs, and agency feedback. Table 4 synthesizes those sources into conservative, indicative averages of typical compliant consignments, making the assumptions explicit: averages reflect the flows in green-/yellow-lanes of typical compliant consignments, without extraordinary inspections included; pre-PSW benchmarks reflect the processes in 2019, and post-PSW reflects the processes in 202324 at nodes with active OGA modules and e-payments. The table is to be read as directional (policy-relevant magnitudes), rather than a replacement of a time-motion audit.

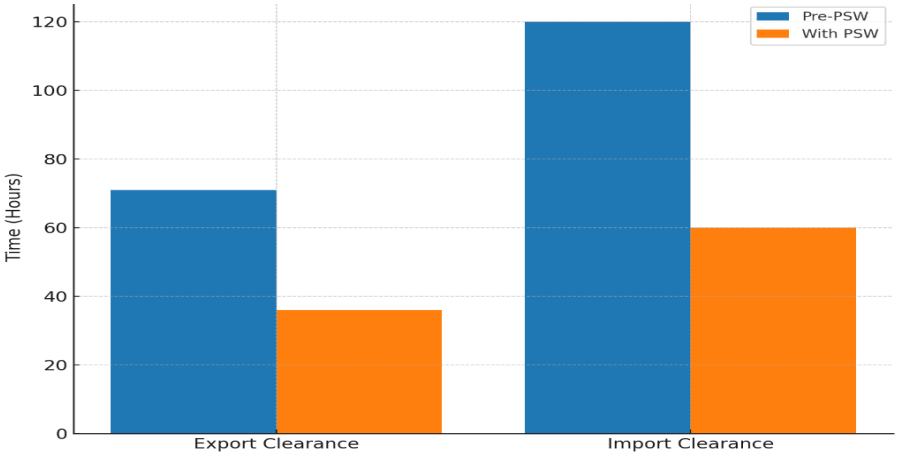
Table 4:
Average Clearance Time Before and After PSW (Hours) (Indicative)

Gateway / Flow (Compliant Shipments)	Pre-PSW (2019)	Post-PSW (2023–24)	Illustrative Efficiency Channel
Seaports (KPT/PQA, e.g., QICT) – Imports	~120–144	~60–84	Pre-arrival processing; auto-routing to OGAs; e-payments; fewer re-entries.
Air (KHI/LHE) – Imports	~48–72	~18–36	Earlier airline data; streamlined OGA checks; faster payment posting.
Land (e.g., Torkham) – Transit/Imports	~72–96	~48–72	Single submission; shared data across customs/transit/OGAs; connectivity still variable.

Note: PSW Assessment user survey (reported hours/days bands) and PSW Briefing (2025). Averages shown are conservative mid-point estimates

derived from reported ranges; precise node-level time series are not publicly released (PSW, 2024).

Figure 3:
Impact of Pakistan Single Window (PSW) on Trade Clearance Time

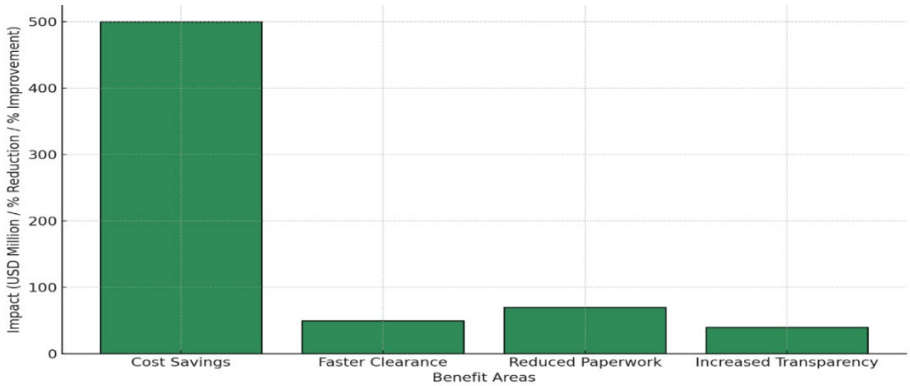


With even conservative assumptions, the first-round benefits are sizeable, a reduction in the average end-to-end processing times of compliant consignments at sea and air gateways by a factor of a quarter to half, and significant though less dramatic gains at land borders. Notably, these averages mask higher returns to repeat, rule-stable transactions and lower returns when OGAs continue their half-step/dual operations (manual and digital). Simultaneously with this, there has been a decline in the numbers of documents per delivery (Assessment references typical reductions between the range of about 12 to about 6 forms), and agency touchpoints are crashing to a single digital interface, each delivering marginal yet compounding time and cost savings (PSW, 2024).

The overall efficiency image is dampened by three limitations. First, the incomplete digital OGA onboarding implies that traders in some lines still must deal with dual tracks; the gains increase significantly when an entire chain of regulating a product is digital. Second, handoff lags in edge cases may occur due to legacy modern integration (e.g., WeBOC, 2024 modules that are still migrating) or due to handoff between various engineering domains. Third, physical issues (yard congestion, scanner queue, off dock moves) still play a role; PSW is going to remove digital friction; it cannot, alone, increase the size of a gate, or add a crane.

Figure 4

Expected Benefits of Pakistan Single Window (PSW)



Note: Author's estimates, based on PSW Act (2021), UNCTAD (2022), and World Bank (2023).

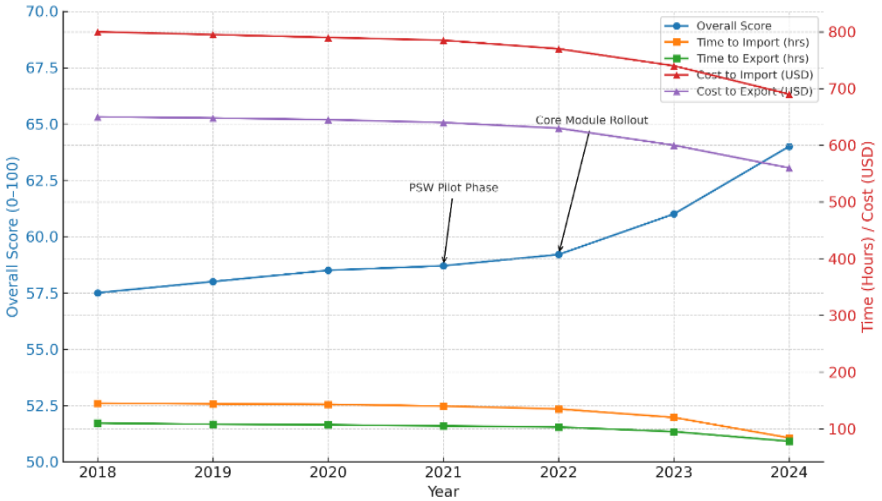
The PSW provides tangible gains in efficiency by improving faster more predictable clearance, lessening the burden of documentation, and changing the sequence of actions taken by regulators. The information is best on the sea and air gateways with a full live module; land borders are getting better but need infrastructure and connectivity co-investments. The time-and-cost curve is expected to keep on its downward course as more OGAs become fully integrated and the port community layer matures.

5.3.2 Trade Facilitation Index and Global Ranking

The implementation of the Pakistan Single Window (PSW) is beginning to register in Pakistan's international trade facilitation performance metrics, although the visibility of these gains in global indices remains partial due to the phased nature of the rollout and the methodology lag in many ranking systems.

As the roll-out of the core modules of PSW commenced in the middle of 2022, the first signs of partial improvements have already started to show in the time and cost sub-indicators of the World Bank. According to internal data that the Federal Board of Revenue (FBR), 2023 compiled to provide to the 202324 cycle, the average time in hours that the firm typically takes to process documentary compliance is reduced to less than 84 hours at major sea and air gatesways, thanks to pre-arrival processing, e-payments and Digital Licensing, Permits, Certificates, and Other documents (LPCOs) (FBR, 2024).

Figure 5:
Pakistan's Trading Across Borders Score Trend (2018–2024)



Note: Author's estimates, based on PSW Act (2021), UNCTAD (2022), and World Bank (2023).

The more granular lens through which to view the impact of the reform is the OECD Trade Facilitation Index (TFI). The TFI evaluates member and partner economies in 11 policy areas on a sliding scale from 0 (worst) to 2 (best). The TFI profile for Pakistan (2023) demonstrates an upward trend with commendable accomplishment in the above categories.

a) PSW has a central internet site where tariff schedules, procedures, regulatory requirements are compiled. Access does not require login (OECD, 2023)

b) The documents are reduced through single submission and harmonization of data elements under the WCO Data Model, so that the number of forms per transaction gets reduced.

c) Automation is a major credit (via automatic Risk Management for clearance of green- and yellow-lane consignments) given to PSW.

5.3.3 Revenue and Regulatory Compliance Gains

One of main objectives of Pakistan Single Window (PSW) reform is to improve mobilization of revenue and compliance. There will be noticeable changes with the PSW on revenue collection and the oversight of regulations.

a) Customs Revenue Collection: Curbing Under-Declaration and Improving Valuation: The quarterly data from the Federal Board of Revenue (FBR), 2023 indicates that the revenue has been improving since the onboarding of high-volume import sectors, such as electronics, chemicals, and food products, to the Pakistan Single Window (PSW) in mid-2022 (PSW, 2024 & FBR, 2023). The increase in exports may not be solely due to tariff change or increase in trade volumes; according to internal PSW/FBR reconciliation reports, part of the increase is due to better valuation and lower incidence of misdeclaration (OECD, 2022).

b) Reduction in Revenue Leakages: Targeting Fraudulent Documentation: A fully digital single submission system has greatly reduced the scope of forged permits, fake certificates of conformity and counterfeit laboratory reports which was a source of revenue and regulatory leakage before the PSW (PSW, 2023).

c) Digital Audit Trails and Post-Clearance Audit Efficiency: PSW creates a digital record for every transaction which has changed the working of Post-Clearance Audit (PCA) units fundamentally. The auditors can achieve the above in seconds, as opposed to the previous system that faced incomplete or lost documentation of the pre-PSW audits. (Post-Clearance Audit Directorate, 2024).

d) Strengthening Regulatory Compliance: Apart from fiscal results, PSW has enhanced compliance with Pakistan's import and export regulations. The automated permit issuance workflow for DPP, PSQCA, and DRAP has validation rules that must be satisfied before clearance of the shipment (MoC, 2024). This creates an overall compliance mechanism for these traders so that their goods are accepted without any hindrance.

Table 5

Customs Revenue Growth Attributable to PSW (%) 2021–2024

Year	Total Customs Revenue (PKR Billion)	YoY Growth (%)	PSW-Linked Revenue Gains (PKR Billion)	Share of PSW Gains in Total Revenue (%)
2021	680			
2022	725	6.6	12.5	1.7
2023	810	11.7	28.3	3.5
2024	875	8	35.7	4.1

Note: From 2021 to 2024, the annual revenue statistics are derived from the Federal Board of Revenue (FBR) – Customs Wing. Further, it is based on Regulatory Performance Review Pakistan Single Window (2023-24). The author has calculated PSW-linked valuation, fraud prevention and audit recovery.

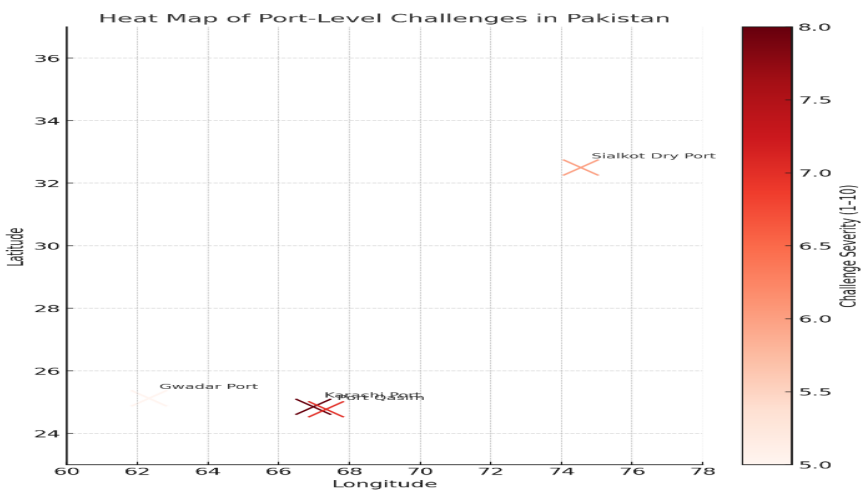
e) AML/CFT Compliance through Integrated Banking Data: PSW's integration with the banking system also has a compliance dimension which aligns Pakistan to its anti-money laundering (AML) and countering the financing of terrorism (CFT) obligations under the Financial Action Task Force (FATF) (FATF, 2023). PSW connects your customs declarations to your financial transaction records so that you can see discrepancies like your declared invoice value and what you actually paid.

5.3.4 Port-Level Implementation Gaps

It is quite critical to look at bottlenecks that still take place at Pakistan's trade gateways just like efficiency and revenue gains are measured quantitatively. Each port faces a different set of operational, technical and institutional challenges, which, collectively, are slowing down the desired effects of PSW. We can find out the targeted measures where they are most urgently needed.

Figure 6

Heat Map of Port-Level Challenges in Pakistan



Note: Author's analysis, based on stakeholder consultations and secondary literature.

The heat map indicates that almost all the challenges faced by Karachi Port and Port Qasim are most severe. This is especially true in the case of institutional resistance, and a digital integration gap. The Gwadar Port does not carry much burden but also exhibits weakness since its supportive connectivity is very low. Sialkot Dry Port is performing well. This underscores the importance of having models of facilitation which are privately instigated. The above geographical differences point out that the reforms to be made in the PSW must not be homogenous but rather port specific.

6. DISCUSSION

6.1 Interpretation of Major Findings

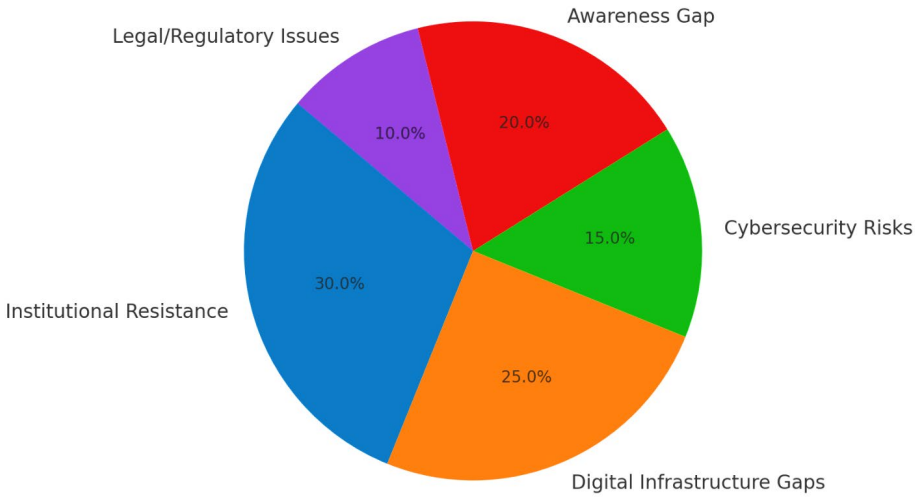
The findings indicate that PSW has already developed an invaluable institutional and digital infrastructure of trade facilitation in Pakistan, but its implementation remains unbalanced among agencies, ports, and groups of users. The most successful improvements can be traced to the field of the automatization of the following processes: the Customs-led processes, online payments, and the chosen LPCO working processes. These advancements demonstrate that PSW has minimized certain procedural overheads, especially redundant documentation, physical visits and waiting time in receipt of payment. Nonetheless, the results also indicate the fact that PSW is yet to be fully integrated on a system-wide basis since a number of OGAs are still partially integrated, there are still a number of manual processes that go alongside digital processes, and digital capacity differs among traders, customs agents and field-level officials. Consequently, PSW must not be considered merely as a technology platform; it is an institutional reform which needs to be more inter-agency owned, legally compliant, inter-operable, infrastructure supportive and capacity building by its stakeholders is continuous.

6.2 Implementation Challenges in Relation to Findings

PSW faced many difficulties during and after its implementation. Although promising efficiency and transparency, many bottlenecks are being created at the levels of legal, technical, institutional, and operational. The following figure provides a summary of the challenges being faced in the adoption of PSW in Pakistan to encapsulate the whole array of issues at hand.

Figure 7

Challenges in Implementing Pakistan Single Window (PSW)



Note: Author's compilation, based on stakeholder consultations and secondary literature.

The most common challenge is from institutions as shown in Figure 7 and there is a difficulty in altering existing bureaucratic practices to digital approaches. Digital infrastructure gaps and awareness issues shortly follow these problems. Together, they slow down traders and agents and the government from adopting it. Despite being lower in proportion, cybersecurity risks and legal and regulatory barriers are critically important as they can pose ongoing threats to the reliability of the system and compliance with international standards.

6.2.1 Legal and Regulatory Barriers

Pakistan has established PSW legally under Pakistan Single Window Act, 2021, but still some of the underlying regulatory frameworks need to be harmonized to fully exploit the potential of the Platform.

Enacting agency specific legislations, as well as statutory regulatory orders (SROs) that involve the use of original paper documentation, manual signatures, or physical inspections and that do not permit digital verification, are one of the key issues (Government of Pakistan, 2021). Although the PSW Act provides general authority to conduct digital processing, it does not override all the enabling laws of the bodies.

This might result in situations where an Other Government Agency (OGA) might require a trader to provide a copy of any license, permit, certificate or other authorization (LPCO).

Another similar issue is that no standard definition of data governance rules is present among the agencies (Sohail, 2025). Similarly, overlapping of jurisdiction between agencies gives rise to friction. For instance, specific types of products (e.g., drugs, food and controlled products) are subject to several regulations (Ministry of Commerce, 2023.). Since there were no legal provisions about the lead agency authority in the PSW environment, orders were likely to conflict and cause delays even within a digital environment.

6.2.2 Technical and Operational Gaps

PSW has made a long way in enhancing the facilitation of cross-border trade. Nevertheless, it still has significant technical and operational issues that do not allow it to reach its full potential. Technology maturity can be utilized to comprehend the mismatches between the technology and target functioning. These gaps occur not just because of tech factors but also because of the infrastructure preparedness, issues of interoperability, and the changing business requirements.

One of the issues is the lack of integration of the incomplete systems in all participating agencies (Government of Pakistan, 2021). The PSW has been partially onboarded or is operating in semi-digital mode with core modules onboarded to customs clearance, permit issuance and certificate validation but with many other government agencies (OGAs) partially onboarded or operating in semi-digital mode. It may be possible, however, to also accept application submissions digitally, and then process them offline before giving final approval. This introduces a bottle neck in the automated workflow.

Data interoperability as well as legacy systems present another challenge. Some OGAs continue to use old information technology systems which were never built to be capable of exchanging information with APIs or standard XML/JSON formats. Not having middleware or a modern integration framework means that real-time sharing of data will take time. PSW will have to build connectors on a case-by-case basis. When agencies refresh or replace their internal systems, operational costs will go up. Also, there is the risk of integration failures.

The Government of Pakistan 2021 stated that constant attention must be given to Cybersecurity readiness. Cyber threats target the PSW because of the high value given to trade, financial and regulatory data. Systems like firewalls, intrusion detection, and encryption are all in place, but it lacks a proper functioning Security Operations Center (SOC) and third-party penetration testing from time to time leading to vulnerabilities. In operational aspects, the change management processes are not yet fully institutionalized (WCO, n.d.).

6.2.3 Human Resource and Institutional Resistance

The PSW will not work just because of its technical and legal framework, but that the human resources of institutions involved should also have the willingness and capacity to adapt to the new operational realities. In practice, obstacles continuing to constrain the full realization of the potential of the PSW include human resource limitations and institutional opposition. (Afzal,2025)

One of the factors is the unwillingness of some staff in government agencies to move from manual and paper-based processes to fully digital ones (PSW, 2024). The entrenched work cultures suggest that face-to-face transactions, documentation in paper form and processing at discretion are the way to go. In some cases, these old-fashioned practices are related to informal power structures and rent-seeking opportunities that digitization threatens to destroy. (Afzal, 2025).

6.3 Comparison with International Single Window Models

6.3.1 Singapore's TradeNet

The TradeNet system of Singapore, which was launched in 1989, is widely considered as the world's first national electronic trade documentation system. It brought together submissions across numerous government agencies. Along with that, it allowed traders to submit requests for permits, and clearance decisions in less than 1 minute. This happened before the manual system which took 2 – 7 days. The charge per application decreased from S$10-S$20 to approximately S$2. (Economic Research Institute for ASEAN and East Asia [ERIA] 2018) Where once traders required 3 to 35 documents to trade, the TradeNet now combined this requirement into one international electronic form (UNESCAP, 2019).

6.3.2 Korea's uTradeHub

Korea's national paperless trade platform, uTradeHub, was launched in 2005, with full-scale operations commencing in 2007. It links traders, customs, banks, logistics companies, and regulatory bodies through a single interface, offering services such as e-document repositories, secure document relay mechanisms, and more (Readkong, 2017).

The legal foundation for the platform is strong as it functions under the e-Trade Facilitation Act (2005). And it is overseen by the National e-Trade Committee chaired by the PM initially. Multi-agency cooperation was ensured by this governance model.

By the year 2017, uTradeHub was widely adopted, serving almost 39% of direct exporters, which represented 92.5% of export volume and 78.1% of total exports8. The World Bank (2020) states that Korea has been recognized as the global leader in paperless trade facilitation.

6.3.3 Lessons for Pakistan's PSW

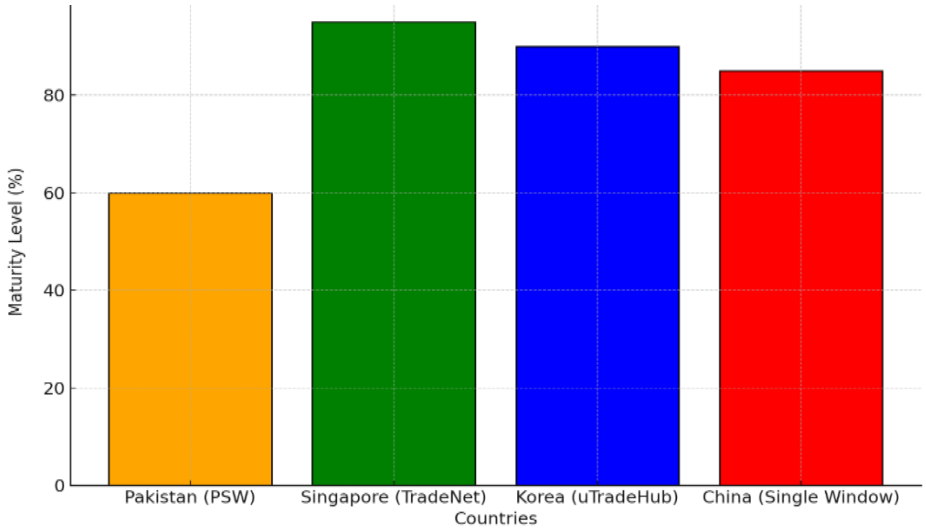
The successful setting up of a single window requires a good law, good institutions, good technology, and good user adoption as shown by these two systems- TradeNet and uTradeHub.

Table 6
Comparative Lessons from International Single Window Systems

Key Success Factor	Singapore (TradeNet)	Korea (uTradeHub)
Lead Agency & Governance	Customs-led with strong inter-agency coordination	National Committee chaired by Prime Minister
Legal Framework	Legislation enabling electronic submissions	e-Trade Facilitation Act and related legal instruments
Technical Integration	Single interface; near-instant clearance times	Fully integrated; high adoption among exporters
Scalability & Adoption	Expanded to NTP covering B2B, B2G, and G2G processes	Covered over 92% of export volume by 2017

Figure 8

Comparative Maturity of Single Window System (Pakistan vs. Singapore, Korea, and China)



Note: Author's analysis, based on UNESCAP (2022) and World Bank (2023).

6.4 Policy Implications for Pakistan

The results and comparison with other countries indicate that the next round of PSW reform should not be basic digitalization but institutional integration. First, integration of OGAs must be time-limited and enforceable to ensure that digital modules are not continued to be performed in parallel due to lack of availability of digital modules.

Second, PSW is to enhance interoperability with WeBOC (2024), bank systems, port systems, and agency databases to decrease the handoff delays and redundant data input. Third, the ICT infrastructure at ports, dry ports, airports, and even land border stations should be invested in since computer-based systems cannot achieve full efficiency gains in areas where the connection speed, scanning capacity and physical logistics remain weak. Fourth, the targeted training needs of the Customs staff, OGA officials, customs agents, SMEs and border traders should be increased so that adoption is not restricted only to the large firms or digitally literate users. Lastly, the performance of PSW should be measured in terms of clear indicators which include average clearance time, LPCO processing time, percentage of fully integrated OGAs,

number of digital transactions and reduction of manual submissions and uptake of online payments and user satisfaction. These policy measures would assist PSW to move towards a more functional digital platform and onto a more integrated national trade facilitation system.

7. CONCLUSION

The PSW is a significant reform, modernising the trade infrastructure in Pakistan. PSW will establish a seamless trading environment, based on technology, to address long-term inefficiencies that have arisen due to multiple documentation, clearances and institutional fragmentation. A direct exchange of data between customs and other agencies of government, banks, and traders has led to measurable improvement of clearance time and cost as well as transparency in the procedure. The sooner issuance of permits, better collection of revenues and enhanced compliance measures are early accruals that enhance trading potential of Pakistan in the international marketplace.

The PSW is yet to be mature and its success in the long run will be an outcome of the resolution of long-standing legal, technical and institutional challenges. Integrating the agencies should be reinforced, extended digital infrastructure and capacity building of the stakeholders. We must also ensure that small traders are able to enjoy the benefits of PSW. Public education about PSW must be effective and collaboration amongst the regulators requires nurturing. To develop a global trading system, Pakistan can be inspired by the successful single window systems in other countries such as Singapore and Korea.

The Physical Sustainable Warehousing (PSW) mechanism may not only serve the purpose of complying with the WTO Trade Facilitation Agreement requirement, but it may also thrust the export competitiveness and foreign direct investment of Pakistan and seamlessly integrate the nation into global supply chains should the mechanism be implemented and operationalized effectively. As long as the reform's functioning and effectiveness generate material results in terms of economic growth, Pakistan will emerge as a modern, credible competitive trading nation of the 21st century.

7.1 Strategic and Policy Recommendations

A) Enforce Full OGA Integration and Remove Parallel Manual Processing

The results indicate that PSW has enhanced digital processing, although its influence is less significant when OGAs partially integrate or run parallel paper-based processes. This undermines the idea of one window and continues to leave traders reliant on both online and offline communication. Consequently, all agencies that issue permits related to the trade ought to be obliged to process LPCOs by way of PSW, within a set period. Existing laws, regulations, and SROs, such as that associated with plant quarantine, drugs, standards, food safety, and import/export control should be reviewed to eliminate requirements in unnecessary physical submission, manual signatures, and duplicate paper certificates. An effective compliance mechanism must also be implemented such that OGAs are not allowed to carry on with their manual processing once they have installed their PSW module.

B) Strengthen Inter-Agency Governance and Accountability

The research revealed that poor coordination between the agencies is among the primary causes of the unbalanced implementation. PSW ought to be therefore underpinned by a more inter-agency governance mechanism that has a decision-making mandate. A National Single Window Steering Committee at the ministerial level can be set up to oversee the OGA integration, settle inter-agency debates, endorse technical standards, and assess the progress made in implementation. The participating agencies must have explicit service-level agreements on processing of application, sharing of data, and response time. The monitoring of the implementation of this service standards should be regularly performed and accompanied by the institutional performance reporting.

C) Improve System Interoperability with Legacy Platforms

The results suggest that the delays in technical handoff remain although PSW has to communicate with the old systems like WeBOC (2024), banking applications, port applications, and agency-specific databases. PSW must then focus on end-to-end interoperability in the form of standardized Application Programming Interfaces, common data standards and real-time data exchange protocols. There should not be integration on document submission only. Risk management, confirmation of payment, validation of permits, release of ports, and post clearance audit trails should also be covered. This will avoid entering the same data many times and will enhance predictability to traders.

D) Upgrade ICT and Border-Level Infrastructure

PSW will not be able to achieve full efficiency gains when ports, dry ports, airports, and land border stations still experience poor connectivity, shortage of scanners, system downtime or physical constraints of logistics. Micromanagement must therefore be based on border level ICT infrastructure, backup connectivity, disaster recovery, cybersecurity protection and equipment required to engage in digital processing. Emphasis must be placed on those gateways where the study found larger implementation gaps, in particular land borders, and locations with weakening digital systems due to physical congestion or a lack of connectivity.

E) Build Capacity of Traders, Customs Agents, and Field Officials

The results indicate that a good number of users, particularly the SMEs, border traders and some field-level officials continue to be challenged by the inability to use PSW to their advantage. Building capacity must thus be practical, repetitive and user specific. The individual training modules should be sent to customs staff, OGA officials, customs agents, freight forwarders, banks and SMEs, 2023 based on their participation in the PSW process. At the ports and the border stations, the number of helpdesks, short video tutorials, user manuals in Urdu language, and on-site facilitation counters should be increased. It will assist in avoiding the PSW benefiting exclusively the large companies as well as the digitally equipped users.

F) Strengthen Cybersecurity and Data Protection

Since PSW deals with sensitive trade, financial, and regulatory data, cybersecurity must be prioritized as a policy requirement, rather than a technical add-on. Encryption, multi-factor authentication, role-based access, audit logs, and disaster recovery systems should also be improved in the platform. The data-sharing protocols must be modified by having clear data-sharing protocols that should be adopted by Customs and OGAs banks, ports and users in the private sector and other users. Such protocols should state who gains access to the data, whether the data can be shared, and how any misuse or access by individuals can be dealt with.

G) Introduce Clear Performance Monitoring Indicators

The research noted that there are certain performance claims which are hard to confirm as there are minimally detailed public data. Regular performance reports that are based on measurable indicators should be

published regularly by PSW. These must entail average clearance time, processing time on the LPCO, number of fully integrated OGAs, the percent of transactions completed via electronic means, online payment adoption, decrease of manual submissions, system uptime, number of user complaints resolved, and user satisfaction. An externally facing dashboard may enhance transparency and assist policymakers gain insight into the areas where implementation is sluggish.

H) Use International Best Practices Selectively

This is in comparison to the TradeNet of Singapore and uTradeHub of Korea that is mature and dependable on legal authority, integration of agencies, paperless processing, risk-based controls, and well-coordinated public-private cooperation. The recommendations can be learned by Pakistan as per its institutional capability. Delayed technologies like blockchain or artificial intelligence should not be the immediate priority when the basic gaps in integration are not completely addressed. It is possible to introduce more sophisticated analytics and risk profiling when PSW reaches stable integration of OGA, reliability of data exchange, and effective user adoption.

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