

SSATP WORKING PAPER March 2025

CATCHING UP ON DIGITAL PORT INFRASTRUCTURE FOR AFRICA







Co-authored by Pascal Ollivier and Olivier Hartmann

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CATCHING UP ON DIGITAL PORT INFRASTRUCTURE FOR AFRICA

Support African ports in gaining a better understanding of the digitalization requirements and steps necessary for compliance with the maritime single window from the IMO convention on facilitation of international maritime traffic 1965



Co-authored by Pascal Ollivier and Olivier Hartmann

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ACRONYM TABLE

AACE	African Alliance for e-Commerce	
API	application programming interface	
AU	African Union	
AWS	Amazon Web Services	
B2B	business to business	
B2G	business to government	
BIMCO	Baltic and International Maritime Council	
BPR	business process reengineering	
CAPEX	capital expenditure	
CBRSW	Cross Border Regulatory Single Window	
CMS	Customs Management System	
СРРІ	Container Port Performance Index	
DPCS	Djibouti Port Community System	
EDI	electronic data interchange	
EDIFACT	Electronic Data Interchange for Administration Commerce and Trade	
EGMSW	Egyptian Maritime Single Window	
ERP	enterprise resource planning	
ETA – ATA	Estimated / actual time of arrival	
ETD – ATD	Estimated / actual time of departure	
FAL	Convention on Facilitation of International Maritime Traffic	
GOS	Gate Operating System	
GPHA	Ghana Ports and Harbors Authority	
GISIS	Global Integrated Shipping Information System	
G2B	government to business	
IPCSA	International Port Community System Association	
IAPH	International Association of Ports and Harbors	
ICT	information and communication technology	
IMO	International Maritime Organization	
ІТРСО	International Task-Force Port Call Optimization	

MSW	Maritime Single Window	
MTS	Egyptian Maritime Transportation Sector	
OPEX	operational expenditure	
PCO	Port Call Optimization	
PMAESA	Port Management Association of Eastern and Southern Africa	
PMAWCA	Port Management Association of Western and Central Africa	
PMIS	Port Management Information System	
PCS	Port Community System	
SOLAS	Safety of Life at Sea	
SSATP	Africa Transport Policy Program	
SPV	special purpose vehicle	
STC	African Union Specialized Technical Committee	
TAS	Truck Appointment System	
TOS	Terminal Operating System	
TMPA	Tanger Med Port Authority	
TTN	Tunisia Trade Net	
UAPNA	Union of Port Administrations of Northern Africa	
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business	
UNCTAD	United Nations Commission for Trade and Development	
UNECE	United Nations Economic Commission for Europe	
VTMIS	Vessel Traffic Management Information system	
WCO	World Customs Organization	
WEF	World Economic Forum	
WTO	World Trade Organization	

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FOREWORD



Jean Francois Marteau, West Africa Transport Practice Manager, the World Bank.

This working paper—the result of an extensive collaboration between the Africa Transport Policy Program (SSATP), the Africa Harbor Master Committee, African regional port management associations, and the African Alliance for e-Commerce—calls for urgent action to accelerate digitalization at ports to streamline maritime trade and empower the resilience of the maritime supply chain.

The IMO FAL.14(46) resolution on government requirement to use a maritime single window (MSW)—a single digital platform for exchanging information and streamlining port call procedures—not only promotes digitalization in shipping but demands it. For the first time, there is a legal obligation resting on governments to develop their digital port infrastructure. This shift from voluntary to mandatory constitutes a catalyst for looking beyond MSW to envision how the digital revolution can improve the efficiency of ports, in Africa and worldwide.

The deadline set by the resolution was January 1st, 2024. More than a year later, inaction is not an option. The engagement of governments, and the need to demonstrate a high-level political will, is the first step on a reform journey which should deliver coordination among border management agencies, more efficient traffic management, culminating with the operationalization of the maritime single window. Along that journey, government agencies and private sector, both domestic and international, need to come together to upskill and reskill human capital towards digitalization of this critical information infrastructure.

African countries are not alone in facing this challenge. The SSATP through its fourth Development Program is ready to continue supporting this endeavor, but a large coalition of technical and development partners are also ready to support them. The International Maritime Organization, the International Association of Ports and Harbors, the World Customs Organization, and the United Nations Commission for Trade and Development have developed a wealth of technical resources that have been made available to countries. Development partners such as the World Bank and the African Development Bank have also made digitalization a priority to support the continent's development goals. We hope this working paper will helps countries to better navigate this digitalization journey.





EXECUTIVE SUMMARY

Maritime trade involves numerous public and private stakeholders, underscoring the need for coordinated engagement in the implementation of new trade facilitation measures. Effective communication, the resolution of stakeholder concerns, and the identification of practical solutions at the national, regional, and international levels are essential to this process. The Facilitation of International Maritime Traffic (FAL) Convention initially streamlined the various declarations required by public agencies through standardized FAL Forms. With the advancement of information and communication technology (ICT) in trade and logistics, the International Maritime Organization (IMO) adopted Resolution FAL.14(46), mandating the establishment of a national Maritime Single Window (MSW). This requirement took effect on January 1, 2024. However, many countries, particularly in Africa, have yet to initiate MSW implementation, highlighting a disconnect between government agencies and shipping interests.

FAL CONVENTION 1965

The IMO Convention on Facilitation of International Maritime Traffic (FAL 1965) aims to facilitate maritime traffic by simplifying and minimizing the formalities, document requirements and procedures on the arrival, stay and departure of ships engaged in international voyages. The contracting governments undertook to adopt all appropriate measures to facilitate and expedite international maritime traffic, and to prevent unnecessary delays to ships and to persons and property on board. The development of an MSW transcends a pure ICT initiative; it represents a comprehensive change management process. Successful implementation necessitates the active participation of stakeholders at all levels, the creation of an enabling legal framework, and robust capacity-building efforts for both public institutions and private sector operators. These challenges are currently faced by many African countries.

MARITIME SINGLE WINDOW

An MSW enables the seamless electronic exchange of information required on the arrival, stay and departure of ships in ports between public and private stakeholders. The main objective of an MSW is to facilitate ship clearance processes in ports for ships on international voyages.

As part of its mandate to facilitate policy development and capacity building in Africa's transport sector, the Africa Transport Policy Program (SSATP) aims to support African ports in navigating the digitalization requirements associated with the IMO FAL Convention. This working paper seeks to provide practical guidance to policy makers and government decision makers (port authorities, ministries of transport, border management agencies), African institutions (African Union Commission, regional economic communities) and development partners on the necessary steps for compliance, fostering greater alignment between policy frameworks and operational practices within the maritime sector.

The previous SSATP working paper,¹ "Status of Digitalization

¹SSATP_Africa_Ports_EN FINAL.pdf



and Policy Impediments in African Ports," highlighted the urgent need to improve digital port infrastructure across the continent. African ports currently have an average digital maturity score of 2.76 on a scale of 0 to 5, reflecting persistent operational inefficiencies, reliance on manual documentation processes, and limited data integration. Strengthening digitalization is critical for optimizing port operations, improving efficiency, and facilitating seamless trade throughout Africa.

Despite ongoing efforts, there is still considerable variance in understanding among African states regarding the full scope and potential of digital systems at ports. Greater clarity is needed on the role of automated systems in both the public and private sectors, as well as the implementation of single window systems at ports.

The Maritime Single Window represents a transformative opportunity for African ports, offering a structured, three-phase pathway to improved efficiency. The first phase focuses on achieving compliance with IMO Resolution FAL.14(46), adopted in May 2022. The second phase expands digitalization across the entire port call process, streamlining operations and enhancing coordination. The final phase aims for port call optimization to facilitate the just-in-time arrival of ships.

To support this transition, this working paper provides a workflow for implementing the Maritime Single Window in the African context. Each step is accompanied by a checklist to guide stakeholders in navigating the technical, operational, and regulatory complexities of transitioning from manual to digital port operations.

- 1. FAL Convention. The first key action focuses on capacity building to ensure a thorough understanding of the FAL Convention and the state-level ratification process. This initiative could support the 26 percent of African member states with seaports that have not yet ratified the IMO FAL Convention.
- 2. Designation of a lead government agency. The second key action involves identifying a lead government agency to oversee MSW implementation. This agency will require strong political will and commitment, and must operate within the existing legal framework governing IMO affairs.
- 3. Selection of the MSW operating model. The third key

action entails selecting the relevant MSW operating model. This decision will be guided by the current state of MSW implementation in Africa, where systems are either deployed as standalone platforms or integrated within Port Community Systems (PCS) or Trade Single Window (TSW). Ghana and the Arab Republic of Egypt, having successfully launched standalone MSW solutions in early 2024, can provide insights into best practices and implementation strategies. SSATP has also identified clusters of countries where PCS and TSW have been implemented prior to MSW, presenting opportunities for leveraging existing systems to facilitate MSW establishment.

- 4. Governance for stakeholder engagement. The fourth key action emphasizes the need to establish a governance framework for stakeholder engagement. This framework will facilitate effective change management and ensure sustained collaboration among all relevant parties.
- 5. Business process reengineering. Empowered by the governance framework, the fifth key action focuses on reengineering the vessel clearance process. This involves transitioning from manual, paper-based documentation management and human-based interventions, such as ship boarding practices, to a more streamlined digital approach.
- 6. Establishment of an operating requirements framework. The final key action focuses on establishing a clear operating requirements framework. It is particularly important to emphasize that the MSW should function as a public service, and the contracting government should not impose charges or fees for its use.

By following this structured approach, African ports can successfully navigate the complexities of MSW implementation, fostering more efficient, transparent, and sustainable maritime trade operations. With the FAL Convention compliance deadline now more than a year past, the urgency for action is clear. Stakeholders must seize this opportunity to modernize port operations, strengthen regional trade integration, and ensure Africa's maritime sector remains competitive in the evolving global economy.





1. INTRODUCTION

In 2021, the World Bank and the International Association of Ports and Harbors (IAPH) released a report on accelerating digitalization in the maritime sector.² This report outlined critical actions needed to strengthen the resilience of the maritime supply chain and provided a roadmap of short-, medium-, and long-term measures for achieving digital transformation. Building on this report, the two institutions published a follow-up report in 2023 focused on Port Community Systems (PCS),³ sharing key lessons and good practices from global experiences.

In March 2024, the World Bank and the Africa Transport Policy Program (SSATP), in collaboration with IAPH, published a study⁴ examining the status of digitalization and identifying policy impediments in African ports. This study assessed the digital readiness of 39 ports in 31 countries by developing a digital maturity score on a scale from 0 to 5. The study found that African ports have an average digital maturity score of 2.76, with the highest score of 4.4 awarded to the port of Tema in Ghana. It is important to interpret these results cautiously, because the study relied on self-reported data from the ports. To refine the accuracy of the digital maturity scores, further on-site diagnostics and comprehensive evaluations of existing digital systems—conducted in partnership with public and private stakeholders—are necessary.

Since 2020, the World Bank has emphasized improving port performance through initiatives such as the Container Port Performance Index (CPPI).⁵ This index aims to support efficiency improvements in container port operations and to promote projects that optimize container port calls. Digitalization plays a pivotal role in optimizing the overall port call process and fostering the just-in-time arrival of ships. Leading African ports in the CPPI rankings, such as Tanger Med (ranked fourth), have successfully implemented port call optimization and just-intime arrival practices. However, for most African ports, the digitalization of the port call process remains in its early stages. Special attention should be paid to digitalizing the entire port call process, encompassing the arrival, stay, and departure of ships, to achieve greater efficiency and competitiveness.

The International Maritime Organization (IMO) has played a leading role in advancing maritime digitalization. At FAL 29 in 2002, the IMO established an intersessional Correspondence Group tasked with examining the feasibility of a single window system for streamlining pre-arrival ship information submissions. This effort culminated in FAL 40 in 2016, where the IMO introduced a mandatory requirement for national governments to implement electronic information exchanges between ships and ports, which came into effect on April 8, 2019. Building on this momentum, the IMO adopted Resolution FAL.14(46), the first international regulation on digital port infrastructure, mandating the establishment of the Maritime Single Window (MSW), which came into force on January 1, 2024. Looking ahead, the IMO plans to expand its digitalization efforts with the development of an IMO Strategy on Maritime Digitalization in 2025. This strategy will encourage the maritime industry to move towards a digitalized future, empowered by emerging technologies to enhance efficiency, safety, security, visibility, predictability, risk

² https://thedocs.worldbank.org/en/doc/773741610730436879-0190022021/original/AcceleratingDigitalizationAcrosstheMaritimeSupplyChain.pdf

³ https://www.worldbank.org/en/topic/trade/publication/port-community-systems-driving-trade-in-the-21st-century

⁴ https://www.ssatp.org/sites/default/files/publication/SSATP_Africa_Ports_EN%20FINAL.pdf

⁵ https://openknowledge.worldbank.org/server/api/core/bitstreams/6cebb847-6f46-44e7-9533-12ac893b3693/content

management, response mechanisms, and environmental sustainability.

In the meantime, the SSATP working paper on digitalization in African ports ("Status of Digitalization and Policy Impediments in African Ports") highlighted the lack of progress in the inception, design, and implementation of MSWs across the continent. To better understand how to support MSW implementation, during the last quarter of 2024, SSATP interviewed ministries, port authorities, and harbor masters from 15 states that have either implemented or are in the process of establishing MSWs. This research identified 12 key issues related to the inception, design, and implementation of MSWs in Africa, as outlined in Figure 1. The two most pressing challenges are a lack of political will—a significant bottleneck in many countries—and decision paralysis due to the existence in several countries of a Trade Single Window (TSW) operator that may be perceived as offering similar functionalities.

Figure 1 – Key MSW Implementation Issues Reported During SSATP Interviews



This SSATP working paper aims to support African ports in addressing the 12 issues highlighted in Figure 1, and to provide a better understanding of the digitalization requirements and steps necessary for compliance with the IMO FAL Convention. Drawing on resources from the IMO, World Bank, IAPH, International Port Community System Association (IPCSA), Baltic and International Maritime Council (BIMCO), World Customs Organization (WCO), United Nations Commission for Trade and Development (UNCTAD), International Task-Force Port Call Optimization (ITPCO), and African Alliance for e-Commerce (AACE), this SSATP working paper clarifies the concepts of MSW, Port Community System (PCS), and TSW. It also provides a practical checklist for implementing a Maritime Single Window, designed to address the unique challenges and opportunities associated with the digitalization of Africa's maritime supply chain.







2. TAXONOMY

In any seaport environment, digital systems for port management and operations can be broadly categorized into two main types: **automated systems** and **single window systems.** These categories encompass the three core dimensions of digital port infrastructure that impact the maritime supply chain: maritime, port, and hinterland operations.

Discussions conducted by SSATP with public authorities across all African regions highlight the fundamental need for a shared understanding of these systems. Clarifying the terminology and taxonomy of automated and single window systems is essential to prevent confusion, misunderstandings, and potential disagreements among public and private stakeholders. Establishing a common language ensures that all parties involved have a clear and consistent understanding of the digital tools and processes required for efficient port operations.

The following two sub-sections define the key concepts and relevant terminology, drawing from authoritative sources, including the World Customs Organization (WCO) Single Window Compendium.⁶

2.1 A CONTROLLED VOCABULARY OF AUTOMATED SYSTEMS

In both governmental agencies and the private sector, automated systems are not to be confused with single window systems or data collaboration platforms that manage inter-organizational business processes. An automated system primarily manages intra-organizational business processes. In the private sector, enterprise resource planning (ERP) systems are commonly known as automated systems. These systems are designed to integrate core business functions, streamline routine processes, minimize manual effort, and reduce errors. An automated system integrates the electronic collection of information, automation of business processes, dissemination of information, and storage of data.

The main public and private automated systems at ports include:

- Vessel Traffic Management Information System (VTMIS)
- Port Management Information System (PMIS)
- Terminal Operating System (TOS), which often incorporates Gate Operating System (GOS) and Truck Appointment Systems (TAS)
- Customs Management System (CMS).

Vessel Traffic Management Information System

The VTMIS is a critical infrastructure managed by the harbor master, based on IMO Resolutions A.158, A.578, and A.857(20), as well as the revised Safety of Life at Sea (SOLAS) Convention. VTMIS contributes to the efficiency of navigation and protection from the possible adverse effects of maritime traffic. It integrates and interconnects all relevant assets⁷ to manage maritime operations safely and securely. This includes the management of maritime operations, from marine environmental protection to traffic management, law enforcement, and security at sea, by integrating a wide variety of sensor assets.

Port Management Information System

The PMIS enables the port authority to control traffic and manage port infrastructure, including port calls, port dues, waste, dangerous goods, inspections, permits, services, security, safety, environment, and assets. Historically, PMISs in Africa has focused on billing, whereas NextGen PMISs are now focused on



⁶ swcompendiumvol1all-parts.pdf

⁷ VTMIS assets are radars, CCTV, radios, meteorological systems, radio direction finders (RDF), the Automatic Identification System (AIS), the Global Maritime Distress and Safety System (GMDSS), the Electronic Chart Display Information System (ECDIC), and control towers related to marine environment protection, traffic management, law enforcement, port efficiency, and security at sea.

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asset management, the Internet of Things (IoT), digital twins, and drones.

Terminal Operating System

A TOS is employed in maritime, waterway, rail-to-rail, and intermodal rail terminal operations to manage automated handling at berths, yards, warehouses, and gates for maritime containers, rail containers, and break bulk. TOS provides planning, visibility, optimization, analytics, and controls. Complementary to a TOS are the GOS, which manages complete gate processes, and the TAS, which manages truck pre-arrival at gates.

Customs Management System

A CMS is not a Trade Single Window. A CMS enables customs

services and processes from its core functions as the frontline government agency at the borders. The core functions include facilitating legitimate trade, securing fair revenue collection, and protecting society. Core processes of CMS include cargo reporting, where the carrier is responsible for the submission of goods declarations prior to or upon arrival or departure of a means of transport for commercial use, including information related to cargo brought to or removed from the customs territory. Customs clearance involves the declarant being responsible to customs for lodging and ensuring the accuracy of the information provided in the goods declaration and for the payment of associated duties and taxes. Finally, customs controls are based on the World Customs Organization Revised Kyoto Convention, which includes risk management.





2.2 A CONTROLLED VOCABULARY OF SINGLE WINDOW

A single window is a digital platform that facilitates the seamless exchange of information between governmental agencies and the private sector through a single submission of required trade data. However, for clarification purposes and to streamline the use of vocabulary in technical literature related to the specific roles of single window systems and automated systems coexisting in a country, the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) recommends that any system must comprise five basic features,



as described in Figure 2, to be considered a single window:

- **Parties involved in trade and transport.** This includes all public and private stakeholders.
- **Standardized information.** The use of internationally recognized standards for single window implementation is key for coordination between stakeholders.
- **Single entry point.** All data concerning a transaction should be submitted electronically by an economic operator only once through a single-entry point.
- Fulfilling regulatory requirements. A single window fulfills a government function and, as such, has received a relevant mandate from the government to perform these actions at the national level and is supported by a legal framework.
- Single submission of individual data elements. Individual data elements that have been submitted should not need to be submitted again.

A single window can only be recognized as a nationally established system if it meets the above five key requirements.

Port Community Systems, Maritime Single Windows, and Trade Single Windows are the three single windows that can be established in any port environment. Each addresses a specific domain and should be interoperable. Nevertheless, several countries in Africa have implemented SWs that cover more than one domain, combining for instance Trade Single Window (TSW) and Maritime Single Window (MSW),⁸ Port Community System (PCS) and MSW,⁹ or even PCS, MSW, and TSW¹⁰ (see Figure 10).

Port Community System

A PCS is a trusted and neutral public-private data collaboration platform that orchestrates, facilitates, streamlines, and optimizes inter- and intra-organizational business processes among maritime supply chain stakeholders through a single submission of data. The scope of a PCS could be limited to one specific port, but to achieve the status of a single window, it should be extended to all ports nationwide and be supported by a legal framework. It could be limited to the port ecosystem, or integrate multimodal transportation such as road, rail, waterways, inland storage facilities, and corridors. In countries such as Mauritius, the Democratic Republic of Congo, and Morocco, the scope of the PCS is extended to hinterland ports and airports.

PCSs have been implemented since the late 1970s in Europe and are now in operation in more than 50 countries and about 400 ports globally. In Africa, PCSs have been established in 12 countries: Algeria, Angola, Benin, Cabo Verde, the Democratic Republic of Congo, Djibouti, Guinea, Mauritius, Morocco, Senegal, Togo, and Tunisia. Mauritius was the first country in Africa to implement a PCS, in 2008. The World Bank and the International Association of Ports and Harbors (IAPH) PCS report¹¹ on lessons from global experience includes three case studies on African PCS operators (Djibouti, Morocco, and the Democratic Republic of Congo). In 2024, the International Maritime Organization FAL 48 Committee approved the Guidelines on Port Community Systems.¹²

Trade Single Window (TSW)

A Trade Single Window (TSW), identified by the World Customs Organization (WCO) as a Cross Border Regulatory Single Window¹³ (CBRSW) and known as a Customs Single Window when the customs authority is the lead agency, enables traders and clearing agents to submit documentation and/or data requirements related to licenses, permits, certificates, and other trade documents for the importation, exportation, or transit of goods through a single entry point to the participating authorities or agencies. After examination by the participating authorities or agencies, the results are sent to the applicants through the single window in a timely manner.

The Trade Single Window concept was initiated by the United Nations Economic Commission for Europe (UNECE) in 2004, and became a key component of the World Trade Organization Trade Facilitation Agreement, which entered into force in 2017, through Article 4.1, by which WTO members shall endeavor to establish or maintain a single window. Trade Single Windows are now implemented in more than 25 countries, including Mauritius, Kenya, Tanzania, Madagascar, Mozambique, South Africa, the Democratic Republic of Congo, Senegal, Morocco, Tunisia, and Egypt.

⁸Such as in Kenya

⁹Such as in Djibouti

¹⁰ Such as in Morocco

¹¹ https://www.worldbank.org/en/topic/trade/publication/port-community-systems-driving-trade-in-the-21st-century

¹² https://www.cdn.imo.org/localresources/en/OurWork/Facilitation/FAL%20related%20nonmandatory%20documents/FAL.5-Circ.54.pdf

¹³ https://www.wcoomd.org/-/media/wco/public/global/pdf/topics/facilitation/instruments-and-tools/tools/single-window/compendium/swcompendiumvol1all-parts.pdf

Maritime Single Window

An MSW enables the seamless electronic exchange of information required on the arrival, stay, and departure of ships in ports between public and private stakeholders. The main objective of an MSW is to facilitate ship clearance processes in ports for ships on international voyages.

Resolution FAL.14(46) contains the provisions concerning the formalities required of shipowners by the public authorities on the arrival, stay and departure of the ship. The amendments to the annex of the FAL Convention make it mandatory for public authorities to establish, maintain, and use single window (SW) systems for electronic exchanges as of January 1, 2024. An MSW is a trusted and neutral public-private data collaboration platform that orchestrates, facilitates, streamlines, and optimizes inter- and intra-organizational vessel clearance and port call processes among maritime supply chain stakeholders through a single submission of data. The first MSW in Africa was implemented in Djibouti in 2019, and MSWs are operational in eight countries to date.

PCS, TSW, and MSW Respective Scopes

Compared to TSW and PCS, an MSW has a more limited scope in terms of processes and stakeholders, as highlighted in Figure 3, Figure 4, Figure 5. The differences between MSW, PCS, and TSW can be understood from their different scope across three dimensions: public stakeholders (Figure 3), private stakeholders (Figure 4), and high-level business processes (Figure 5).

The scope of MSW and TSW are primarily business to government (B2G) and government to business (G2B), but MSW could extend to business to business (B2B) for port call services. The scope of PCS since its foundation four decades ago has been a B2G-G2B-B2B platform.

The MSW focuses on the vessel clearance process and has the potential to be extended to the port call process chain (Figure 5 and Figure 6). In contrast, a PCS is centered on trade logistics events related to shipments, vessels, equipment, cargo, transport, and storage. The TSW addresses the regulatory aspects of preclearance and clearance of cross-border flows of traded goods, including the processing of licenses, permits, certificates, customs declarations, and other documents required by border management agencies.



Figure 3 – Public Sector Stakeholders for PCS, MSW and TSW

Figure 4 - Private Sector Stakeholders for PCS, MSW and TSW



Figure 5 - High Level Business Processes for PCS, MSW and TSW





3. MSW - THREE STEP JOURNEY TOWARDS PORT CALL OPTIMIZATION

The implementation of the Maritime Single Window (MSW) presents numerous opportunities for countries and ports with low or average digital maturity scores.

Step 1: Handling the mandatory regulatory requirements.

The first opportunity is to leverage the first-ever international regulation on digital port infrastructure to fully re-engineer the vessel clearance process. This involves collaboration with all relevant governmental agencies, shipping and cruise lines,

Table 1 - FAL.14(46), Section 2.1: 13 Mandatory Declarations

and agents, based on the IMO FAL.14(46) resolution, the IMO Compendium on Facilitation and Electronic Business (which includes the IMO Data Set and the IMO Reference Model), and the IMO FAL.5/Circ.42/Rev.3¹⁴ guidelines for setting up an MSW. The resolution mandates that public authorities shall not require any additional declarations upon the arrival or departure of ships beyond those specified in Section 2.1 of the Annex to the FAL Convention (1965) (Table 1).

a)	General Declaration
b)	Cargo Declaration
c)	Ship's Stores Declaration
d)	Crew's Effects Declaration
e)	Crew List
f)	Passenger List
g)	Dangerous Goods Manifest
h)	Delivery Bill for Mail Consignment
i)	Maritime Declaration of Health
j)	Ship Sanitation Control Exemption Certificate or Ship Sanitation Control Certificate or Extension
k)	Security-related Information Required Under SOLAS Regulation XI-2/9.2.2
l)	Advance Electronic Cargo Information for Customs Risk Assessment Purpose
m)	Advance Notification Form for Waste Delivery to Port Reception Facilities

¹⁴ https://www.cdn.imo.org/localresources/en/OurWork/Facilitation/FAL%20related%20nonmandatory%20documents/FAL.5-Circ.42-Rev.3.pdf

Step 2: Managing the full port call process.

The second opportunity is to utilize both the IMO FAL.5/Circ.42/ Rev.3 and FAL.5/Circ.5¹⁵ guidelines for harmonized communication and electronic exchange of operational data for port calls. This will facilitate the digitalization of the entire port call process on the nautical, operational and administrative levels. The scope of involved stakeholders expands to include vessel services providers, such as pilotage, towage, mooring, ship chandlers, and bunkering. It covers B2B operations, such as port planning, berth planning, and nautical services planning. It also entails managing other administrative and regulatory services, such as vessels inspection, ballast water declaration, and crew and passenger landing cards. It could also handle the associated digitalized payments, including e-payment gateway, digital wallets and mobile payments.

Step 3: Port Call Optimization.

The third step is to move towards Port Call Optimization (PCO) (Figure 6), promoting the just-in-time arrival of vessels through extensive data collaboration with shipping lines, nautical

and vessel service providers, terminal operators, and harbor masters. PCO¹⁶ describes 17 time stamps corresponding to key stages of the port call, from the arrival time at the pilot boarding place to departure from the pilot boarding place, including time at berth and service time at berth. Monitoring time stamps, including their reliability and respective duration, is critical to fostering just-in-time arrival of ships and efficient operations. Tanger Med Port's implementation of this threestep digitalization journey serves as a performance measurement example, ranking Tanger Med fourth in the World Bank's Container Port Performance Index (CPPI). The digitalization of the port call process is a core component of MSW, driving the operational efficiency and performance of the port.

Finally, the opportunities extend beyond the implementation of an MSW. The experience gained in setting up an MSW—particularly in project governance, stakeholder coordination, and interoperability—lays a strong foundation for expanding digitalization efforts to the Port Community System (PCS), as demonstrated by the Djibouti Port Community System and the ongoing implementation in Namibia.



Figure 6 - Steps towards Port Call Optimization

¹⁵ https://www.cdn.imo.org/localresources/en/OurWork/Facilitation/FAL%20related%20nonmandatory%20documents/FAL.5-CIRC.52.pdf ¹⁶ GIA-just-in-time-hires.pdf







4. IMPLEMENTATION CHECK LIST IN THE AFRICAN CONTEXT

Based on lessons learned from interviews conducted in the fourth quarter of 2024 with ministries, ports, and harbor masters on their experiences in establishing Maritime Single Windows (MSWs) in Africa, the SSATP has developed a pragmatic implementation checklist for IMO member states in Africa, as described in Figure 7. The checklist includes the following steps:

- 1. Address the status of ratification of the FAL Convention.
- 2. Mandate a lead agency to implement, operate, and maintain the MSW at the national level.
- 3. Assess the current digital cluster environment to determine whether to develop a standalone platform or inte-

grate the MSW as an additional functional requirement of an existing Port Community System (PCS) or Trade Single Window (TSW).

- 4. Establish an institutional framework for collaboration.
- 5. Initiate an "As-Is To-Be" analysis for business process reengineering.
- 6. Address all requirements to operate and maintain the MSW in the long term.



Figure 7 - Workflow

4.1 FAL CONVENTION



Ratified or Not Ratified?

Before starting the implementation process of an MSW, the critical first action is to focus on the legal and regulatory framework to determine whether a government has ratified the FAL Convention of 1965. As of now, 14 countries with seaports and 26 maritime and landlocked countries have not ratified the FAL Convention (Map 1). Notably, Mali and Burundi have ratified the FAL Convention but have not ratified the IMO Convention. Conversely, Djibouti, Morocco, and Angola have implemented an MSW despite their respective states not yet ratifying the FAL Convention.

Map 1 - Status of FAL Ratification by State (as of Dec 2024)



 If a government has ratified the FAL Convention, it is important
 to review the historical acceptance of the Convention on the International Maritime Organization and the FAL ratification
 process. This includes examining the legislation enacted and identifying the public authorities responsible for the acceptan ce, implementation, amendment, and enforcement of the FAL Convention. At the time of acceptance of the IMO Convention, a cross-sectional ministerial committee for IMO affairs should have been established to monitor all IMO conventions and eva luate related topics. This committee could include representatives from the ministry of foreign affairs, ministry of maritime affairs, ministry of defense, ministry of transport, ministry of finance, ministry of health, ministry of environment, and the national port authority.

If a government has not ratified the FAL Convention, the relevant public authorities responsible for IMO affairs should be consulted to initiate the ratification process. This involves engaging key government agencies, industry stakeholders, and legal experts to assess the implications of ratification. It also requires reviewing existing legislation to identify necessary amendments or new laws needed to align national regulations with the convention. Additionally, the process must fulfill constitutional and legal requirements, such as parliamentary approval or executive endorsement, before the country can formally commit to the treaty. Once these steps are completed, the final stage is the formal ratification by depositing the necessary instruments with the IMO. A structured and well-coordinated approach will ensure a smooth adoption of the FAL Convention, enhancing compliance with international maritime regulations.

It is important to note that Djibouti, Morocco, and Namibia, among others, are in the process of ratifying the FAL Convention. The main challenge is often the complexity of the ratification process. This process may involve approval by the attorney general, the cabinet, the parliament, and the head of state. However, ratifying the convention brings compliance benefits and ensures alignment with international standards in shipping.

The MSW process goes beyond pure FAL compliance, and will create value for each government and tangible benefits for the private sector. The main benefits are:

- **Regulatory compliance.** Promoting transparency, accountability, and the elimination of red tape.
- **Cost reduction.** Reducing trade costs and bureaucratic practices through documentary compliance.
- Service efficiency. Achieving high levels of service efficiency through holistic tracing of vessel dwell time, efficiency of compliance services, and coordinated border management.
- Supply chain predictability. Increasing supply chain predictability through optimized and automated processes, advanced vessel and cargo information, and risk management.

Understanding the FAL Convention

Stakeholders involved in the implementation of an MSW should familiarize themselves with the FAL Convention, an IMO treaty aimed at facilitating maritime traffic. The convention simplifies formalities, minimizes documentary requirements, and streamlines procedures for the arrival, stay, and departure of ships on international voyages.

Contracting governments commit to adopting measures that expedite maritime traffic and prevent unnecessary delays to ships, passengers, and cargo. The FAL Convention consists of 16 articles that include general provisions, the scope of the convention, and the notification and entry into force requirements. The substantive part is in the annex of the FAL Convention, which comprises the standards and recommended practices on formalities, documentary requirements, and procedures to be applied upon the arrival, stay, and departure of ships, their crews, passengers, baggage, and cargo. It also includes implementation procedures and appendixes that provide additional information to the convention.

According to the FAL Convention, public authorities in member states are responsible for the application and enforcement of the laws and regulations related to the Standards and Recommended Practices contained in the annex. In the context of FAL.14(46), public authorities shall review and amend, if required, the legal and regulatory framework established at the time of the ratification of the FAL Convention by the state.

For countries that have not ratified the FAL Convention, ratification should improve compliance, efficiency, and performan-



ce in the global maritime supply chain. The IMO is available to provide tailored support to contracting parties to start the FAL ratification process.¹⁷

In the short to long term, the IMO encourages all stakeholders involved in the clearance of ships, cargo, crew, and passengers—such as customs, immigration, health, port authorities, and shipping agents—to actively participate in the FAL Committee discussions. This involvement is essential to stay ahead of the latest advancements in maritime digitalization, the IMO Compendium, and any amendments to the Annex of the FAL Convention. Active participation will not only help anticipate future developments, but also position stakeholders as thought leaders in addressing Africa's specific needs. At FAL 49, member states decided to initiate the development of a comprehensive strategy for maritime digitalization.¹⁸

Understanding the FAL.14(46) Resolution

It is essential to spend time developing a good understanding of the FAL.14(46) Resolution¹⁹ to avoid any misunderstandings, because several MSW implementations are not in compliance with the resolution. There are eight points that are essential for an MSW implementation:

1. Stakeholder consultation and process review. The lead agency should introduce the MSW project, and initiate public and private stakeholder consultations to review the vessel clearance process. This includes evaluating existing procedures, eliminating those that are unnecessary, and determining which procedures should be digitalized, with a focus on pre-arrival and pre-departure information for the expedited subsequent release or clearance of cargo and persons. This means that a focus on business process reengineering is required. In many countries, the vessel clearance process is cumbersome, and MSW implementation is an opportunity to move away from national over-regulation and boarding ships for clearance.

- Standard declarations. All 13 declarations listed in Section 2 A 2.1 are standard provisions within the scope of the single window. Declarations a) to g) are known as FAL declarations.
- **3.** Information requirements. Public authorities shall not require more information for FAL declarations mentioned in points a) to g) of Standard 2.1 than what is required as shown in FAL.14(46) Appendix 1.
- 4. Data submission and automation. Figure 8 illustrates that data submitted once through the MSW will automatically populate all declarations. This example is specifically related to Section 2.1bis on Voyage Information.
- 5. Electronic declarations. As of January 1, 2024, FAL forms no longer exist and are superseded by FAL electronic declarations and six additional declarations based on the IMO Compendium^{20,21} on Facilitation and Electronic Business, consisting of the IMO Data Set and the IMO Reference Model.
- Cargo declaration. The cargo declaration in Section 2 A – 2.1 – b) is often confused with the cargo manifest. The cargo declaration data set is different and serves a different purpose. Its requirements are listed in Appendix 1 of the FAL Resolution 14(46).
- 7. International standards compliance. Data required by public authorities shall be submitted in conformity with internationally agreed standards, including UN Electronic Data Interchange for Administration, Commerce, and Transport (UN/EDIFACT) standards, the World Customs Organization (WCO) Data Model, or International Standards Organization (ISO) standards.
- 8. Interoperability requirements. The MSW shall be designed upon IMO mandatory interoperability requirements introduced by the IMO in April 2019,²² such as UN/EDIFACT standards. Engaging shipping and cruise line agents to establish electronic data interchange (EDI) or application programming interface (API) is a key requirement.

¹⁷ https://www.imo.org/en/OurWork/Facilitation/Pages/FALGuidance-default.aspx

¹⁸ FAL 49/8/1 IMODOCS

¹⁹ https://www.cdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/FALDocuments/FAL14(46).pdf

²⁰ FAL.5/Circ.53

²¹ https://imocompendium.imo.org/public/IMO-Compendium/Current/index.htm

²² https://www.cdn.imo.org/localresources/en/MediaCentre/HotTopics/Documents/SIMPLE%20AND%20EFFICIENT%20CROSS%20BORDER%20TRADE.pdf



Figure 8 - How the Voyage Dataset is Populating FAL 1, 2 and 7 Declarations

Key Takeaways

Establishing an MSW will require that knowledge of the FAL Convention be shared among public authorities and the private sector to foster compliance, efficiency, and competitiveness in the maritime supply chain. A clear high-level political commitment to enforce the IMO FAL Convention across governmental agencies and the private sector is required. IMO member states and stakeholders are encouraged to participate in the IMO FAL Committee to be at the forefront of maritime digitalization and to anticipate any further regulations.

4.2 LEAD AGENCY



Once public authorities overseeing the nationwide implementation of the IMO FAL Convention have been identified and clarified, the second critical action is for the government to provide high-level political commitment by mandating a public authority as the lead agency to implement and operate the MSW. The government should allocate an adequate budget to ensure the long-term sustainability of the MSW, including its implementation, operation, and evolution. Equally important, several government agencies have very low levels of digital maturity, particularly those still operating with manual documentation processes. The implementation of the MSW is an opportunity to drive the digitalization of all governmental agencies engaged in the vessel clearance and port call processes. The choice of the lead agency depends on the political will and digital maturity level required to embark on the MSW journey. In Africa, MSW lead agencies range from ministries (such as transport or finance) to national port authorities (Figure 9).

The MSW mandated by the FAL Resolution is a national platform, not a system dedicated to a specific port. The institutional framework for Africa's port sector varies based on the number of ports in a country and whether the port authority operates at a national level or if there are several independent entities (Map 2).

Several states have mandated the national port authority for the implementation of the MSW, even when a dedicated maritime administration exists, such as in Ghana and Namibia.



Figure 9 – Leading Agencies for African MSWs in Operation

MINISTRY OF FINANCE	 Kenya - KenTrade SPV Tunisia - TTN SPV
MINISTRY OF TRANSPORT	Egypt, Arab Rep MTS (Box 2)
NATIONAL PORT AUTHORITY	 Ghana - GPHA (Box 1) Morocco - APN - Portnet SPV and TMPA Angola - Port of Lobito Djibouti - DPFZA - DPCS Mauritius - MPA





Several factors can influence the choice of a national port authority over a maritime administration, including the operational-oriented focus and financial capability of the port authority, with the harbor master as the process owner of vessel clearance, as opposed to the regulatory-oriented focus of a maritime administration. Difficulties in identifying a lead agency arise in cases where the institutional architecture comprises several independent port authorities without an overarching national agency, such as in Mauritania, Mozambique, or Côte d'Ivoire. In such cases, the ministry of transport should coordinate the port authorities at the national level for the implementation of the MSW.

Box 1 – National Port Authority as Lead Agency - Ghana Case Study

In January 2023, a high-level delegation from Ghana, including members of the Parliament Committee on Transport, the Ministry of Transport, the Ghana Shippers Authority (GSA), the Ghana Maritime Authority (GMA), and the Ghana Ports and Harbours Authority (GPHA), participated in the IMO-IAPH-BIMCO Symposium on the Maritime Single Window. The government of Ghana reaffirmed its commitment to comply with the FAL Convention to reduce unnecessary delays in maritime traffic. This commitment was underscored when the Ministry of Transport mandated the GPHA as the lead agency to implement the Maritime Single Window at the national level in the second quarter of 2023.

MSW in Ghana is a stand-alone platform designed in a collaboration with public and private stakeholders, implemented internally by GPHA, and hosted on the Azure Cloud. MSW went online on May 1, 2024, streamlining vessel clearance at Ghana ports nationwide





Box 2 - Ministry of Transport as Lead Agency - Egypt Case Study

Ministerial Decree No. 167/2023 ²³ was issued by the Egyptian Ministry of Transport to establish the Egyptian Maritime Single Window (EGMSW). Subsequently, Ministerial Decree No. 224/2023 was issued to amend the membership of the ad hoc committee responsible for establishing and implementing the EGMSW for Egyptian ports, ensuring compliance with the latest requirements of the International Convention on the Facilitation of Maritime Traffic.

The Ministry of Transport of Egypt was mandated to establish the EGMSW in collaboration with 15 port authorities, including the ports of Alexandria, Al Dekheila, Damietta, Adabya, Ain Sokhna, West Port Said, East Port Said, Al Arish, Tor, Hurghada, Nuwaiba, Tawfik, Safaga, Sharm Al Sheikh, and Zaytiyat. Additionally, the collaboration included the Egyptian Customs Authority, the Egyptian Authority for Maritime Safety, the Travel Documents, Immigration and Nationality Administration (TDINA), the Egyptian Health Quarantine, the Egyptian Civil Defense Department, and shipping agents.

Following a training phase in the first quarter of 2024 for public and private stakeholders and a subsequent test period, the first phase of the EGMSW went live on April 15, 2024, at 15 ports.

²³ https://www.mts.gov.eg/wp-content/uploads/2024/09/%D9%82%D8%B1%D8%A7%D8%B1503.pdf

The decision-making process for designating the lead agency at the government level will be influenced by two primary factors: the existence of a national port authority and the existing digital infrastructure for trade and logistics. Regardless of these factors, the lead agency will be mandated based on high-level political will.

The simplest case is when there is a national PCS in operation in the country. In that case, it is strongly recommended to designate the PCS lead agency as lead agency for the MSW implementation. The decision on the operating model, in Section 4.3, is predetermined by this choice. In the absence of a national PCS, the decision matrix (Table 2) provides guidance for the designation of the lead agency. The factors influencing the decision on the lead agency when a TSW is in operation in the country explain why the issue of TSW competition is ranked so high in the challenges expressed during the interview (Figure 1). In that situation, the CEO of the national ports authority and the minister of transport must champion the MSW implementation to obtain the nomination as lead agency from the highest political level. This decision must be enshrined in a legislative instrument (for instance a decree) at the cabinet level.

Table 2 - Lead Agency Decision Matrix

	TSW IN OPERATION	NO TSW
NATIONAL PORT AUTHORITY	Decision must be made at highest political level but the decision is in practice predetermining the operating model in the next step (Section 4.3)	National ports authority as lead agency
NO NATIONAL PORT AUTHORITY	Line ministry for TSW as lead agency if the highest political level choice is to combine TSW and MSW in Section 4.3	Ministry of transport as lead agency

Key takeaways

A lead agency shall be mandated to implement and operate the MSW through a legislative instrument (decree). Depending on the country's configuration and the level of

4.3 OPERATING MODEL

STAKE-**OPERATING** FAL CONVENTION

nance.

Pathways: MSW as Standalone or Part of PCS or **TSW Platform?**

The MSW presents significant opportunities for the digitalization of the maritime supply chain. Public authorities can implement the MSW according to two primary scenarios. The first scenario involves the MSW as a standalone platform, as seen in Ghana. The second scenario applies when a PCS or TSW is already implemented and operational in a country, which opens up additional options. For instance, in Kenya, the MSW can function as a service within the TSW, whereas in Djibouti, it can operate as a service within the PCS, or else as a combination of the two options (Figure 10). In two African countries, an operator provides MSW, PCS, and TSW as services under a special purpose vehicle.

Each scenario expands the scope of business processes and

stakeholders involved in each single window, as illustrated in Figure 3 to Figure 5.

political will, the lead agency could be the national ports

authority, the ministry of transport, or the ministry of fi-

The Africa Transport Policy Program (SSATP) identified three types of country clusters in 34 African countries regarding the single window landscape prior to MSW implementation (Map 3):

- First cluster: Five countries with only PCS in operation.
- Second cluster: Twenty-one countries with only TSW in operation.
- Third cluster: Eight countries with both PCS and TSW in . operation.

PCS and TSW platforms are implemented either under the aegis of a line ministry (such as finance, transport, or trade) or a governmental agency (such as port or customs) and are sometimes operated under a special purpose vehicle (e.g., public-private partnership (PPP) or a concession agreement).

Figure 10 - Overview of MSW Implementation Scenarios as of December 2024





Map 3 - Type of Digital Port Infrastructure Clusters Prior to MSW Implementation



Depending on the choice of the lead agency and the pre-existing digital infrastructure, there are two main scenarios for the development of a Maritime Single Window (Figure 11 and Figure 12).

Key Takeaways

The lead agency has the option to establish a standalone platform or to leverage existing digital infrastructure, such as a PCS or TSW, by creating an MSW service. Leveraging existing infrastructure can be highly efficient in terms of stakeholder engagement.



Figure 11 - Scenario 1: MSW Built as a Stand-Alone Platform

PHASE 1 PHASE 2 Opportunity to Evolve Into a Stand-alone MSWs Full-fledged PCS Need to engage stakeholders to establish ins-Adding terminal operators, tutional framework, adhesion to the project, and build trust multi-modal transport operators, Need for capacity building for both governfreigh forwards, ment agencies and private operators to meastorage facility operators, ningfully participate in the process insurance companies, importers Key decisions about the ICT infrastructure and exporters... have potential long-term consequences Operating model decisions have equally far-reaching consequences

Figure 12 – Scenario 2: MSW as a Service of PCS or TSW

PHASE 1

Pre-existing TSW or PCS

Public and private collaboration established

Port community already built and trust established

Stakeholders conversant with digital processes

Existing ICT infrastructure

PHASE 2

Additional Functionalities of an MSW

Shipping lines and agents already using a PCS

Some governmental agencies involved in vessel clearance are have already implemented a TSW

4.4 STAKEHOLDER ENGAGEMENT



4.4.1 Institutional Framework

Once the ratification of the FAL Convention has been approved, the lead agency has been mandated, and the operating model has been selected, the next step is to establish an institutional framework for collaboration between the public and private sectors. This framework will ensure stakeholder engagement and facilitate effective change management.

In the case of a standalone MSW, the institutional framework (Figure 13) related to the governance of the project should be designed with a multi-layered governance structure. This structure should include an inter-ministerial committee, a steering committee, a business process committee, working groups, and a project implementation committee to address major reforms at ports nationwide. Governance will be fundamental in establishing collaboration between governmental agencies and fostering collaboration between the public and private sectors. This collaboration is essential to build trust and drive significant maritime supply chain reforms.

Establishing the institutional framework will require a clear definition of the roles and responsibilities of each stakeholder. It will also necessitate strong leadership and political will at the prime ministerial or presidential level to ensure effective coordination and successful implementation. The institutional framework shall be included in the legal instruments nominating the lead agency. The participants, along with their roles and responsibilities, are detailed in Section 6.2 of the World Bank and International Association of Ports and Harbors report²⁴ Ac-

INTER-MINISTERIAL COMMITTEE	 Political commitment Legal and regulatory framework
STEERING COMMITTEE	 Public agencies and private sector representatives Decision making
BUSINESS PROCESS COMMITTEE	 Coordinated border management As-Is / To-Be
STAKEHOLDER WORKING GROUPS	• Bilateral engagement by stakeholder and by topic
PROJECT IMPLEMENTATION COMMITTEE	Project management

Figure 13 – MSW Institutional Framework

celerating Digitalization: Critical Actions to Strengthen the Resilience of the Maritime Supply Chain.

At the time of the historical acceptance of the IMO Convention, a cross-sectional ministerial committee for IMO affairs to monitor all IMO conventions may have been established, and an inter-ministerial committee should already be in place. If not, the government has two options: to establish the inter-ministerial committee as a standalone committee or to establish it as a component of the steering committee.

If the MSW is implemented as a service within a PCS and/or TSW, the government could leverage any existing institutional framework for PCS or TSW governance such as a national port community council or national trade facilitation committee (NTFC). Appropriate actions should be taken to enact and/or regulate the MSW within that framework, as seen in Djibouti and Kenya.

4.4.2 Human Capital

It is important to ensure that the right individuals are part of the MSW journey. Each committee member should be appointed by their director general and officially empowered to represent and engage their organization. Each organization should have a permanent representative and an alternate representative to ensure business continuity in every committee. Once the focal points have been identified, a capacity gap assessment would be helpful to assess their specific training needs to develop appropriate capacity building programs. This includes providing legal, operational, functional and technical knowledge sharing and training. The lead agency should play a community-building role, connecting both public and private stakeholders to support MSW implementation and facilitating a smoother transition to the operation phase of the MSW. For example, in Kenya, about 500 people were trained on MSW.

It is critical to appoint a project implementation committee manager who is empowered by their authority and has the capacity to manage complex projects and drive change management across government agencies and the private sector. The project manager should be proficient in several domains, including public-private collaboration, legal frameworks, business process reengineering, coordinated border management, standardization, interoperability, cloud computing, cybersecurity, and risk management. The project manager will be a critical resource for the project implementation committee. The IMO has developed an e-learning course²⁵ on the generic implementation of MSW that will be beneficial to the project manager and all MSW stakeholders. The SSATP paper is complementary to the IMO e-learning course by addressing the specific circumstances of African countries.

During the business process reengineering phase of vessel clearance, it will be critical to engage process owners in each governmental agency, particularly harbor masters at the national level and local port authorities. Ad hoc bilateral working groups will be particularly required during the business process reengineering phase to foster discussions and redesign the vessel clearance process in a digitalized world.

It will be essential to have well-trained and skilled personnel with a good knowledge of vessel clearance to avoid issues that other countries have faced when training individuals not directly involved with MSW. Clearly defining the roles and responsibilities of those to be trained should be on the checklist. Training sessions with agents should be prioritized and scheduled well in advance to avoid no-shows.

A specific collaboration platform, such as SharePoint, Teams, or Google Docs, should be established to foster trust, visibility, knowledge sharing, and ongoing communication among all committee members.

Finally, the MSW project should be on the agenda of the executive committees (EXCOs) of governmental agencies and shipping and cruise line agents to facilitate the availability of staff for stakeholder engagement and training.

Key Takeaways

Stakeholder engagement is critical and should be supported by the president, prime minister, and lead agency to drive major reforms among agencies. This will require the establishment of an institutional framework for collaboration, where executives, senior staff, and process owners within the public and private sectors shall collaborate. Prioritizing the MSW project among executive committees (EXCOs) will be necessary to ensure staff availability during the stakeholder engagement process and the training phases.





²⁴ https://documents1.worldbank.org/curated/en/886091611731721594/pdf/Accelerating-Digitalization-Critical-Actions-to-Strengthen-the-Resilience-of-the-Maritime-Supply-Chain.pdf

²⁵ https://lms.imo.org/moodle310/user/edit.php?id=15384&course=1

4.5 BUSINESS PROCESS REENGINEERING



The institutional framework includes a business process committee, which is tasked with Business Process Reengineering (BPR), a key action for change management to drive MSW design implementation.

4.5.1 Coordinated Border Management

Engaging the main governmental agencies related to the vessel clearance process is essential for the MSW project. Collaboration with at least the maritime authority, customs, agriculture, health, environment, and immigration authorities is required to move toward coordinated border management, which will facilitate the implementation of MSW. Equally important, MSW will become a pillar to foster coordinated risk management in a second phase.

The lead authority will play a crucial role in engaging governmental agencies to build trust and collaborate on the "As-Is / To-Be" analysis, the evolution of the legal framework, and the path toward coordinated border management, as described in Figure 14. The harbor master shall play a key role as the owner of the port call process.



Figure 14 – Coordinated Border Management

In 2015, the WCO developed comprehensive guidelines²⁶ for Coordinated Border Management (CBM), promoting an inclusive approach that connects various stakeholders involved in border management.

The WCO-IAPH Guidelines²⁷ on the Cooperation between Customs and Port Authorities, released in 2023, address the need for collaboration and convergence of customs and port systems for both trade facilitation and supply chain security. The guidelines highlight the need for both directors general to lead the cooperation by defining a common agenda.

Beyond the vessel clearance process, as described in the WCO-IAPH Guidelines on Cooperation between Customs and Port Authorities, advanced vessel information and advanced cargo information will enable advanced coordinated risk management using joint targeting and risk management systems.



4.5.2 "As-Is / To-Be" Analysis

The As-Is analysis of the vessel clearance process is a particularly effective way to build trust among public and private stakeholders under the leadership of the harbor master, the process owner of the port call process. One methodology to build trust is to start the As-Is analysis with bilateral meetings with each government agency and shipping/cruise agents and lines representatives. The overall consolidation of knowledge, including the legal framework analysis, should then be shared during multilateral workshops to build a common understanding and to identify opportunities to reform the vessel clearance process.

The To-Be analysis should be empowered by high-level political will to streamline the coordinated border management of the vessel clearance process at the national level. Although the FAL Convention is related to ships engaged in international voyages, the government can decide to apply the same provisions to domestic voyages (cabotage).

The Namport As-Is analysis (Figure 15) depicts the current vessel clearance process at the Port of Walvis Bay along with the Directorate of Maritime Affairs (DMA), Namport Port Captain (Namport PC), Port Health, Ministry of Fisheries and Natural Resources (MFRN), Immigration and NamRA (Customs).

Business Processes

In the To-Be analysis, data orchestration between all public and private stakeholders will be at the center of the vessel clearance process to enable business process automation of the overall port call process. Data orchestration of the vessel clearance shall be based on the IMO Compendium, which provides semantic definitions of the data elements and formats. As a good international practice, the European MSW Environment regulation²⁸ could enrich the MSW knowledge. An interoperability framework should be leveraged to consider the legal, organizational, semantic, and technical dimensions, as outlined in the European Interoperability Framework.²⁹

ICT Infrastructure for the Stakeholders

During the As-Is and To-Be analyses, it will be necessary to consider the digital maturity of all government agencies and shipping and cruise line agents, because the environment could sometimes be limited to paper-based documentation management without any digital infrastructure.

Engaging in discussions with the main shipping and cruise lines to implement EDI and/or API is essential to avoid data quality and liability issues due to errors related to manual data entry in Excel files.

Legal Framework

As mentioned in Section 4.1, from day one, a major focus should be placed on the legal framework by the leading agency. Beyond the ratification of the FAL Convention, a recent analysis of two international financial institution projects highlighted that the port call legal framework could impact 18 laws, decrees, and regulations in a large South American state and 11 legal instruments in a small island developing state in the Pacific. The digital transformation of the vessel clearance process will require an in-depth legal review during the As-Is business process analysis, to map the legal instruments associated with the vessel clearance process that require paper-based documentation management and human interaction, such as boarding.

Key Takeaways

MSW is a major change management project, and the business process reengineering should be empowered by high-level political will to foster coordinated border management and risk

management related to the vessel clearance process. The harbor master shall play a key role as the owner of the port call process.



²⁶ https://www.wcoomd.org/-/media/wco/public/global/pdf/topics/facilitation/instruments-and-tools/tools/safe-package/cbm-compendium.pdf?db=web

²⁷ https://www.wcoomd.org/-/media/wco/public/global/pdf/topics/facilitation/instruments-and-tools/tools/wco-iaph-guideline/wco-iaph-guidelines-on-cooperation-between-customs-and-port-authorities_en.pdf?db=web

²⁸CELEX :32023R0205 : EN:TXT.pdf

²⁹ https://interoperable-europe.ec.europa.eu/collection/nifo-national-interoperability-framework-observatory/european-interoperability-framework-detail

Figure 15 - As-Is Analysis Namport



4.6 MSW OPERATOR REQUIREMENTS



The last key action of the checklist addresses all operating requirements. At the project management level, scheduling operating requirements actions and related tasks shall be done at the beginning of the MSW project.

4.6.1 Public Service

According to FAL.14(46) 2.1.1, public authorities shall not impose charges or fees for information required for the clearance of

ships, including the electronic provision of such information. In Africa, most MSW implementations have been considered public services. However, it should be noted that the Egyptian Transport Ministerial Decree No. 503/2024³⁰ imposes a fee for rendering electronic services to vessels upon arrival. This fee, set at 1,000 Egyptian pounds (approximately US\$20), is based on a "cost for service" principle to ensure the financial sustainability of the platform. This approach reflects a case-by-case



³⁰ https://www.mts.gov.eg/wp-content/uploads/2024/09/%D9%82%D8%B1%D8%A7%D8%B1503.pdf

basis, where fees are considered based on sustainability costs, with a minimal fee applied accordingly.

This public service obligation may necessitate an amendment to the concession contract to exclude charging a fee for MSW transactions when the MSW is implemented as an additional functional requirement of a TSW or PCS developed by a special purpose vehicle (SPV) under a concession agreement.

4.6.2 Cybersecurity

MSW should be considered as a critical information infrastructure for national security, and must adhere to national security principles. Regardless of whether a country has enacted a cybersecurity legal framework, the MSW architecture should integrate a standard security framework at the initial stage of ICT implementation. The MSW architecture should manage secure protocols with digital certificates for the exchange of confidential information and be built upon the ISO 27001:2022 standard, which requires at least 93 controls for information security. It should also include two-factor authentication (2FA) for all users. However, cybersecurity by design is not sufficient; cyber resilience should be implemented by leveraging the IAPH Cybersecurity Guidelines³¹ for Ports and Port Facilities, endorsed by IMO MSC-FAL.1/Circ.3/Rev.2 Guidelines on Maritime Cyber Risk Management.

The March 2025 session of the IMO Facilitation Committee (FAL 49) included a proposal to amend the Annex to the FAL Convention to mandate cybersecurity measures for safeguarding Maritime Single Windows (FAL 49/19/1). The African Union (AU) Convention on Cybersecurity and Personal Data Protection, known as the Malabo Convention, adopted on June 27, 2014, aims to establish a comprehensive legal framework for cybersecurity, electronic transactions, and personal data protection across Africa.

The World Bank is updating the Port Reform Toolkit; the third edition, due to be published this year, will include a module on digital port infrastructure, which will provide additional guidance on cybersecurity.

4.6.3 Architecture

Cloud

Since 2016, port authorities have gradually moved to cloud infrastructure, but cloud adoption is not yet the norm at African ports. Djibouti implemented MSW and PCS with Amazon Web Services (AWS), and Ghana implemented MSW with Microsoft Azure. Leading authorities should prioritize cloud computing, including edge services, to provide high service level agreements.

It is essential to align these initiatives with local data regulations and laws to ensure compliance and secure implementation. If the cloud service is hosted outside the country, legal and regulatory challenges must be addressed. Key workarounds include adhering to data localization laws by using hybrid cloud solutions, ensuring cross-border data transfers comply with privacy regulations, and partnering with local providers to bridge the gap between local and international cloud infrastructure. Additionally, ensuring the cloud provider complies with international cybersecurity and data protection standards, while collaborating with authorities to establish legal frameworks for cross-border hosting, can help maintain data security and compliance.

Interoperability

MSW should be interoperable with other automated systems at government agencies and private sector systems to achieve full data collaboration. Implementing APIs with shipping and cruise agents and lines is necessary. Standardizing data formats and coding systems is crucial to ensure smooth integration and communication between diverse systems. Adopting internationally recognized data exchange standards will streamline the exchange of critical maritime data, enhancing efficiency, reducing errors, and enabling a more connected digital ecosystem.

the low level of digital maturity of some government agencies and shipping agents may require manual data entry into the MSW in the short term, but all efforts should be made to make this transition phase as short as possible. It is the role of the lead agency to advocate with the cabinet to dedicate adequate financial resources for agencies to create or upgrade their digital infrastructure.

Scalability

The MSW architecture should be scalable for potential future implementations, such as a port community system involving more stakeholders and users within the maritime supply chain, and more B2G, G2B, and B2B processes related to the movement of transportation modes, equipment, goods, and people.

³¹ https://sustainableworldports.org/wp-content/uploads/IAPH-Cybersecurity-Guidelines-version-1_0.pdf

Ecosystem Digital Maturity

Specific attention should be given to government agencies engaged in the vessel process that may still operate manually with paper-based transactions. The need for digital infrastructure should be assessed by government agencies and shipping and cruise lines agents, including personal computers (PCs), laptops, tablets, telecom infrastructure, and cybersecurity requirements, as well as capital expenditure (CAPEX) and operational expenditure (OPEX) requirements.

4.6.4 Financial Plan

MSW is not a simple ICT project; the architecture should be scalable for evolution towards something such as a PCS. It should be efficient, providing interoperability with shipping and cruise lines agents, customs, and other government agencies. It should be resilient, offering comprehensive service level agreements along with help desk, customer services, and in-person and online training.

A financial plan is critical to ensure the long-term sustainability of the MSW, adhering to one of the five key principles of public-private data collaboration (Figure 16). This includes proper budget forecasting, strategies for reducing maintenance costs, well-negotiated support agreements, planned skills transfer, and ongoing upgrades to ensure the system remains adaptable and efficient as demands evolve.

The CAPEX and OPEX for implementing and operating an MSW are highly dependent on the decisions made in Section 4.3. A standalone MSW will require a dedicated entity to operate it (ICT infrastructure, staffing, etc.), whereas an MSW as a service of a TSW or PCS will benefit from an existing operator with greatly reduced incremental cost for the added functionalities. Based on the interviews, CAPEX may range from hundreds of thousands of US dollars to millions US dollars. Additional information on financing digital port infrastructure can be found in the thematic note on financing the development and operation of a PCS from the IAPH World Bank PCS guidelines. ³²

Expanding the MSW beyond the initial regulatory require-

ments towards full port call process and optimization will also significantly affect the CAPEX.

4.6.5 Risk Management

As with any complex project, it is essential to establish risk management from day one by identifying potential risks, assessing the probability of occurrences and project impact, and implementing risk mitigation measures. The main risk categories include political, financial, operational, technological, and human resources risks. Lessons learned from experiences in Africa highlight the critical importance of risk management from the outset.

4.6.6 Policy and Regulatory Requirements

The adoption of the Data Policy Framework³³ at the African Union Summit in February 2022 marked a significant step towards establishing a unified data market and standardized data governance systems in Africa. The African Digital Compact³⁴ and Continental Artificial Intelligence Strategy,³⁵ endorsed by the African Union Specialized Technical Committee (STC) on Communications and ICT in June 2024, constitute Africa's contribution to the Global Digital Compact and the United Nations Summit of the Future in September 2024. These strategies are anchored in the digital transformation strategy for Africa.

Regardless of the scenario selected by the leading authority, it is mandatory to consider data governance from day one as a key principle of public-private data collaboration³⁶ to avoid issues between public and private stakeholders.

The government shall enforce the MSW in accordance with the FAL Convention ratification by the state. Consequently, a legal act issued by the president, prime minister, or line minister will be necessary.

The reengineering of the vessel clearance business process will significantly impact the legal and regulatory frameworks of related governmental agencies. This transformation aims to eliminate paper-based transactions and human interactions,

³⁶ https://www.weforum.org/stories/preview/e7f3b292-5be4-4dfc-9162-119a11898653/



³² https://www.worldbank.org/en/topic/trade/publication/port-community-systems-driving-trade-in-the-21st-century

³³ https://au.int/sites/default/files/documents/42078-doc-AU-DATA-POLICY-FRAMEWORK-ENG1.pdf

³⁴ https://au.int/sites/default/files/documents/44005-doc-AU_Digital_Compact_V4.pdf

³⁵ https://au.int/sites/default/files/documents/44004-doc-EN-_Continental_AI_Strategy_July_2024.pdf

Figure 16 - WWFive Principles of Public Private Data Collaboration



thereby promoting digitalization. The agencies involved include the maritime administration, port authority, customs, health, agriculture, fisheries, environment, and immigration. Data governance will also require the update or establishment of various laws, acts, or regulations. These will include any acts pertaining to electronic transactions, data protection, open data, digital government, cybersecurity, cloud services, and telecommunications. Additionally, MSW operators must establish a memorandum of agreement for MSW data exchange, end user agreements, service level objectives, and service level agreements.

Key Takeaways

The lead agency for the implementation of MSW can leverage existing digital infrastructure (such as a PCS or TSW) or establish a standalone platform. This platform should enable cloud computing and cybersecurity measures to safeguard the new critical infrastructure. It should also feature a scalable architecture to expand the scope of MSW to additional services, such as the Port Community System, if the MSW is developed as a standalone platform. Operating the MSW will require a comprehensive legal framework, including an electronic transaction act, data protection act, and cloud act, in compliance with the Africa Digital Compact and Data Policy Framework. Finally, the MSW should be a public service as per the FAL Convention, and public authorities should not charge any fees in connection with the MSW.





5. OVERVIEW OF KEY TAKEAWAYS

The successful implementation of Maritime Single Windows (MSWs) in African ports hinges on several critical factors, encompassing regulatory compliance, governance structures,

stakeholder engagement, and technical requirements. The following key takeaways outline the essential elements needed to facilitate this transition:

FAL CONVENTION

Establishing an MSW will require that knowledge of the FAL Convention be shared among public authorities and the private sector to foster compliance, efficiency, and competitiveness in the maritime supply chain. A clear high-level political commitment to enforce the IMO FAL Convention across governmental agencies and the private sector is required. IMO member states and stakeholders are encouraged to participate in the IMO FAL Committee to be at the forefront of maritime digitalization and to anticipate any further regulations.

LEAD AGENCY

A lead agency shall be mandated to implement and operate the MSW through a legislative instrument (decree). Depending on the country's configuration and the level of political will, the lead agency could be the national ports authority, the ministry of transport, or the ministry of finance.

OPERATING MODEL

The lead agency has the option to establish a standalone platform or to leverage existing digital infrastructure, such as a PCS or TSW, by creating an MSW service. Leveraging existing infrastructure can be highly efficient in terms of stake-holder engagement.



STAKEHOLDER ENGAGEMENT

Stakeholder engagement is critical and should be supported by the president, prime minister, and lead agency to drive major reforms among agencies. This will require the establishment of an institutional framework for collaboration, where executives, senior staff, and process owners within the public and private sectors shall collaborate.

Prioritizing the MSW project among executive committees (EXCOs) will be necessary to ensure staff availability during the stakeholder engagement process and the training phases.

BUSINESS PROCESS REENGINEERING

MSW is a major change management project, and the business process reengineering should be empowered by high-level political will to foster coordinated border management and risk management related to the vessel clearance process. The harbor master shall play a key role as the owner of the port call process.

OPERATOR REQUIREMENTS

The lead agency for the implementation of MSW can leverage existing digital infrastructure (such as a PCS or TSW) or establish a standalone platform. This platform should enable cloud computing and cybersecurity measures to safeguard the new critical infrastructure. It should also feature a scalable architecture to expand the scope of MSW to additional services, such as the Port Community System, if the MSW is developed as a standalone platform.

Operating the MSW will require a comprehensive legal framework, including an electronic transaction act, data protection act, and cloud act, in compliance with the Africa Digital Compact and Data Policy Framework. Finally, the MSW should be a public service as per the FAL Convention, and public authorities should not charge any fees in connection with the MSW.







6. NEXT PRACTICAL STEPS

WHAT IMO CAN PROVIDE

The FAL section of the International Maritime Organization's website (IMO.org) includes many resources on maritime single window (MSW), including the e-learning MSW module, the Global Integrated Shipping Information System (GISIS), and MSW implementation case studies from member states. If requested, the IMO may be able to assist member states with the following:

- Conduct a national stakeholder workshop on the FAL Convention and MSW implementation.
- Conduct a needs assessment mission on the implementation of an MSW.

FINANCIAL AND TECHNICAL SUPPORT FROM DEVELOPMENT PARTNERS

In the interviews conducted for this paper, financing was rarely mentioned as a challenge (Figure 1). However, if countries need technical and financial assistance, development partners such as the World Bank and the African Development Bank can provide international expertise during the scoping process. This process clarifies the magnitude of the financing needs for the MSW and typically includes a gap assessment of the legal and regulatory framework. It would also include a readiness assessment of the technical and operational environment, establish the As-Is analysis with the stakeholders, and prepare a tailored implementation roadmap for the MSW. If the government is willing, that roadmap could be included in a broader investment operation financed by the development partners. Countries can also reach out to technical agencies such as UNCTAD. UNCTAD submitted at FAL.49 an information paper introducing the digital platform ASYHUB Maritime, a pilot project that may be of interest to Member States to comply with the requirement to implement Single Window by January 2024.

REFERENCES

This section contains 10 key reference materials for onboarding or empowering the maritime single window (MSW) journey.

FAL Convention

IMO reference materials provide information from the international regulator for worldwide shipping, allowing users to better understand the dimensions of the FAL Convention.

- IMO FAL Convention Guidance
 <u>https://www.imo.org/en/OurWork/Facilitation/Pages/</u>
 <u>FALGuidance-default.aspx</u>
- IMO FAL.14(46) resolution on the Maritime Single Window https://wwwcdn.imo.org/localresources/en/ KnowledgeCentre/IndexofIMOResolutions/ FALDocuments/FAL.14(46).pdf
 - IMO FAL.5-Circ.42-Rev.3—Guidelines on Implementing a Maritime Single Window System
 https://wwwcdn.imo.org/localresources/en/OurWork/
 Facilitation/FAL%20related%20nonmandatory%20
 documents/FAL.5-Circ.42-Rev.3.pdf
 - IMO e-learning course on the Maritime Single Window IMO e-Learninghttps://lms.imo.org/moodle310/



Stakeholder Engagement

Implementing an institutional framework through a high-level decree will foster collaboration among governmental agencies and with the private sector.

 Institutional Framework from the World Bank and the International Association of Ports and Harbors: Accelerating Digitalization: Critical Actions to Strengthen the Resilience of the Maritime Supply Chain. https://thedocs.worldbank.org

en/doc/ 773741610730436879-0190022021 /original/ Accelerating DigitalizationAcrosstheMaritimeSupplyChain.pdf

Business Process Reengineering

Coordinated border management will be critical to drive business process reengineering of vessel clearance. The World Customs Organization (WCO) CBM Compendium is the reference on how to foster cooperation between governmental agencies

Coordinated Border Management Compendium from the WCO

https://www.wcoomd.org/-/media/wco/public/global/ pdf/topics/facilitation/instruments-and-tools/tools/ safe-package/cbm-compendium.pdf?db=web

The IMO compendium is the foundation layer of MSW and consists of the IMO Data Set and the IMO Reference Model.

IMO Compendium
 <u>https://imocompendium.imo.org/public/IMO-</u>
 <u>Compendium/Current/index.htm</u>

The guidelines for harmonized communication and electronic exchange of operational data for port calls guide the implementation of the electronic and automated exchange of operational data between ships and ports.

Guidelines for Harmonized Communication and Electronic Exchange of Operational Data for Port Calls https://wwwcdn.imo.org/localresources/en/OurWork/ Facilitation/FAL%20related%20nonmandatory%20 documents/FAL.5-CIRC.52.pdf

Operator Requirements

Two critical requirements in the implementation of the MSW operator relate to cybersecurity and the legal framework to operate an MSW.

- Cybersecurity Guidelines for Ports and Port Authorities https://sustainableworldports.org/wp-content/ uploads/IAPH-Cybersecurity-Guidelines-version-1_0. pdf
 - Legal Framework: example from Egyptian Ministry of Transport—Decree on Maritime Single Window https://www.mts.gov.eg/wp-content/uploads/2024/09 /%D9%82%D8%B1%D8%A7%D8%B1503.pdf







