



**UNIVERSITY OF
PORTSMOUTH**

**Evaluating critical factors to the implementation of Single window system (SWS) in the
case of Abidjan port – from stakeholders’ perspectives**

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“Whilst registered as a candidate for the above degree, I have not been registered for any other research award. The results and conclusions embodied in this research are the work of the named candidate and have not been submitted for any other academic award.”

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Abstract

In West Africa, international and sub-regional trade costs are widely recognised as major disincentives to shippers, stunting economic development. In fact, West African ports suffer from inefficient customs and port operations, especially when it comes to clearance procedures. The West African ports are turning to Single Window System (SWS) as a solution to these challenges, but they are finding it difficult to implement fully paperless SWS. Despite its benefits, the SWS implementation is a very complex and costly undertaking that requires great efforts, cost, a change of mindset, and most importantly, political will from the government.

Therefore, this study explores the critical factors influencing the implementation process of SWS in developing countries using the port of Abidjan as a case study. This culminates in a proposed framework developed based on existing literature, company documents and theories. It was then revised using qualitative-empirical data from semi-structured interviews with fourteen participants from fourteen different public and private stakeholders. Thematic analysis was used as a commonly used method for analysing semi-structured interviews.

This study evaluates the criticality and map SWS critical factors with key stakeholders at every implementation stage. The result of this study shows that, the criticalities of the critical factors influencing SWS implementation differ per stakeholder. Furthermore, the findings have shown that while the technological context is important for the implementation of a SWS, the greatest challenges the authorities face can be attributed to the organizational and environmental context of the TOE framework. Therefore, the researcher has added two new subcategories to the organizational and environmental context of the TOE framework to adapt it to SWS implementation.

This has significant practical implication to decision makers from developing countries and scholars, allowing them to prioritise their actions to reduce the impact of challenges as they implement the SWS.

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List of abbreviation

AACE: Association for the Advancement of Computing in Education

ADB: Asian Development Bank

ARTCI: Agence de Regulation des Télécommunications de Côte d’Ivoire

ASYCUDA: Ivorian Customs IT system

CEO: Chief Executive Officer

CSW: Customs single window system

DGAMP: Direction Générale des Affaires Maritimes et Portuaires

DOI: Diffusion of Innovation

EPCSA: European Port Community System Association

ERP: Enterprise Resource Planning

ESCAP: Central Asia Regional Economic Cooperation.

ETA: Estimated Time Arrival

ETD: Estimated Time of Departure

GUCE-CI: Guichet Unique des Opérations du Commerce Extérieur de Cote D’Ivoire

ICT: information and communications technologies

IDT: Innovation Diffusion Theory

IFDC: International Fertilizer Development Center

IPCOEA: Amélioration des douanes portuaires et de l'efficacité des opérations en Afrique

IS: Information System

IT: Information Technology

MSC: Mediterranean Shipping Company

MSW: Maritime single window system

NRI: Networked Readiness Index

NSW: National Single window system

OIC: Office Ivoirien des Chargeurs

PAA: Port Autonome d'Abidjan

PCS: Port community system

RFCV: Rapport Final de Classification et de Valeur

SCT: Social Cognitive Theories

SSA: Sub-Sahara African

SWIF: Single Window Implementation Framework

SWS: Single Window System.

TAM: Technology Acceptance Model TAM

TOE: Technological Organisational and Environmental

TPB: Theory of Planned Behaviour

TRA: Theory of Reasoned Action TRA

UN/CEFACT: United Nations Centre for Trade Facilitation and Electronic Business

UNCTAD: United Nations Conference on Trade and Development

UNECE: United Nation Economic Commission for Europe

UNNEtT: United Nations Network of Experts for Paperless Trade and Transport in Asia and the Pacific
ASEAN Association of Southeast Asian Nations

UTAUT: User Acceptance of Information Technology

WC: World Customs Organization

Chapter One Introduction

1.1 Introduction

The Single Window System concept was developed in 2005 by the United Nation Economic Commission for Europe to simplify and facilitate trade. Thus, many West African ports have begun implementing it to boost international trade and become a regional hub. The need for the SWS come emerged because ports in West Africa are challenged with inefficient customs and port operations, particularly regarding administrative clearance procedures. Reportedly, the cost of ports operations, involving multiple stakeholders, institutions, organisations, can easily exceed more than 70% of the value of the cargo as suggested by Gikonyo et al. (2019). These costs for international and sub-regional trade in West Africa are widely recognized as crucial disincentives to shippers, hampering the growth of the whole region. According to Gohomene et al. (2015), congestion is considered as one of the core issues in West African ports. For example, in the port of Abidjan, the average waiting time at anchor is 3 days and at dock is 5.4 days, which gives 8.5 days of waiting time in total. In other West African ports, the average waiting time at anchor is 2.3 days and the dock side is 4.7 days (PAA, 2020).

The implementation of a fully paperless SWS can significantly reduce the waiting time of vessels by anticipating the procedures of reception of vessels and of customs clearance of goods as suggested by Kabui et al. (2019). Unfortunately, according to a report published by Dutta & Lanvin (2020), due to ICT infrastructure and organisational issues, West African ports are struggling to achieve the implementation of a full paperless SWS. In most cases, the difficulties are numerous and come from the variety of stakeholders with different interest most of the time (Jovic et al., 2021). Using the port of Abidjan as a case study, this research aims to evaluate the criticality of factors influencing SWS in the port of Abidjan at every

implementation stage within the context of developing countries from stakeholders' perspectives.

In the introductory chapter, section 1.2 elucidates the problem background and, thus, the motivation for this thesis; section 1.3 highlights the research aim; section 1.4, highlights the research question and objectives; & section 1.5 focuses on the scope of the thesis.

1.2 Background and research context

Global trade expanded rapidly during the 1980s and 1990s. The resulting complexity and speed of the modern supply chain and the number of parties involved greatly increased the requirements for information controlling the flow of goods. However, despite the breakneck developments in information and communications technologies (ICT) and trade data-exchange standards simultaneously, trade documentation exchanges remained mostly paper-based (WCO, 2015). However, in the modern trade environment such paper-based exchanges deter the need for efficiency and security. To address the paper-based exchange challenge which has gained considerable momentum, the United Nation Economic Commission for Europe (UNECE) in 2005 launched a system called "Single Window". UNECE (2013) defines the Single Window as a facility that allows parties involved in trade and transport to lodge standardized trade-related information and/or documents to be submitted once at a single-entry point to fulfil all import, export, and transit-related regulatory requirements. Single window as a trade facilitation tool is about process reforms that would improve documentation and reduce cargo dwelling duration.

This implies that reforms such as the introduction of a paperless-based exchange system would enhance national trade competitiveness by improving import/export procedures and document handling among government agencies and private stakeholders (Joshi, 2017). According to the

UNECE (2013), the SWS is expected to support governments achieve significant objectives such as an improved trade documentation and document handling process amongst government agencies and private stakeholders; cause a reduction in the logistics cost and dwelling time of cargo at ports; and implement a more transparent and accountable process aimed at deterring corruption and providing equal opportunity for a variety of stakeholders.

Despite its benefits, it is important to note that Single Window implementation is an extremely complex project and capital-intensive undertaking. In other words, creating a national Single Window system requires tremendous efforts, cost, change in mindset and more importantly, strong political will (Keretho, 2013). In addition, in our digital and internet-fueled age, all implementations of the “Single Window” have invariably been coupled with the use of ICT to help automate and create a paperless trading environment (WCO, 2015). For practical purposes, the establishment of “Single Window” today can only be achieved via the utilisation of ICT and the internet (Caldeirinha et al., 2022). Owing to the complexity involved in the implementation of the Single Window, most governments choose an incremental step-by-step implementation process rather than a “big bang” implementation approach to their Single Window projects. Some governments begin with a limited form of the Single Window, for example to cover either a specific procedure such as export declarations or a specific area such as the port — ‘Port Single Window’ or ‘Port Community System’ (WCO, 2015).

According to IPCOEA (2021), in West Africa, countries have mainly adopted a port-centric Single Window, termed as “Guichet Unique des Opérations du Commerce Extérieur” (GUCE), or “Single Window of foreign trade”. During the implementation process of the single window, countries in West Africa are experiencing several challenges such as ICT Infrastructure; Legal framework; Partnership and collaboration among stakeholders; Top management issues; Change management; Government support; Lead agency role and financial resources, which

side-tracks the expected results for the single window system (WCO, 2015). According to WCO (2015) the challenges highlighted are equally experienced by a majority of developing countries in the world. The ranking of West African countries by the world bank as part of the “doing business” index stands as a proof of the challenges faced by such countries in international trade. In terms of trading across borders, the World bank ranked Senegal 123, Côte D’Ivoire 110, Ghana 118, Togo 97, Benin 149, and Nigeria 131 (World Bank, 2020).

The World Bank trading across borders ranking takes into consideration the time and costs it takes to export and import as well as time and cost associated with documentary compliance. These statistics demonstrate that West African countries are lagging in the aforementioned areas compared to their counterparts in Europe, Asia, South America etc. Therefore, this highlights the need for the implementation of a fully functional SWS to facilitate and improve regional and international trade. Furthermore, currently in West Africa most of the large-scale companies are dissatisfied with the SWS, because the automation process has not been fully implemented and some important agencies are not linked to the SWS (Peterson, 2017). According to Peterson (2017), some traders still submit documents manually where given the rapid economic growth West African countries are experiencing, having an import/export clearance process with proper connectivity is a major need today (IPCOEA, 2021).

Sub-Sahara African (SSA) countries, particularly West African countries have pursued broad-based customs reform efforts that, in some cases, include both infrastructure and institutional (soft infrastructure) reform (Peterson, 2017). In West Africa, for example, customs reform is often associated with so-called “hard infrastructure reform,” including the building or improvement of roads, railways, airports, and seaports, information, and communications technology (ICT) systems, and reliable sources of power. “Soft infrastructure reform”

encompasses the streamlining and harmonization of customs and border procedures. In most Sub-Sahara African (SSA) countries, the national single windows coexist alongside paper-based systems, diminishing the time and cost savings that the single windows system provides. The paper-based system may occur where countries lack adequate information technology to fully implement an electronic single window or in countries that must first establish a supportive regulatory environment to bypass traditional paper-based systems (Peterson, 2017). This clearly demonstrates how challenging the implementation of the Single window system in West Africa tends to be. This implies that the single window systems introduced in some countries in West Africa are thus restricted in scope. For example, in West Africa, some countries such as Benin and Togo have single window systems that are paper based, with plans to digitize these systems as their resources may permit (AACE, 2017).

Choi (2011) highlights that according to a worldwide survey conducted by the World Customs Organisation (WCO) on the implementation of single window system, the key factors that hinder the establishment of an electronic linkage by other government agencies with Customs clearance system are as follow: the lack of information and communication technology (ICT) (34%); budget and human resource constraints (25%); inadequate legal framework (21%); difficulties in inter-agency co-ordination (12%); and other factors (8%). The result of this survey brings to light the lack of information and communication technology (ICT) (34%) as the top-most challenge related to the electronic linkage between government agencies and the customs clearance system.

Preliminary surveys have evidenced that “political will and ICT infrastructure are key factors required in the successful establishment of SWS in West African ports” (Dutta & Lanvin, 2020). Nationally in Côte D’Ivoire, the ICT sector performance has improved considerably over the past five years, thanks to all the measures that were implemented by the ICT sector

authorities. This advance in ICT has occurred in both the legal and regulatory sphere, and nationally. Nevertheless, the development of the ICT sector in Côte d'Ivoire has lagged somewhat behind. It ranks 115th out of the 134 economies included in the NRI 2020 index (Dutta & Lanvin, 2020). Therefore, Cote D'Ivoire has a long way to go in comparison to developed countries that operate with advanced ICT standards.

Some of the key challenges confronting the ICT sector in Cote D'Ivoire are the low capacity of internet provided and the affordability of IT access, for which Côte d'Ivoire was ranked 127th in the NRI 2020 index (Dutta & Lanvin, 2020). In the country, consumer and business usage of the internet continue to evolve at a slower pace. Ironically, while computers and internet access remain dismally low relative to ICT programs put in place, mobile penetration is amazingly high. According to figures from the country's telecoms regulator, the Telecommunications/ICT Regulation Authority of Côte d'Ivoire (Autorité de Régulation des Télécommunications/TIC de Côte d'Ivoire, ARTCI), at the end of June 2018, the mobile penetration rate reached 131%, up from 122% one year earlier. Subscription numbers largely surpass the country's population, as mobile users tend to subscribe to different operators to benefit from the various promotions. Indeed, with a subscription rate of 53%, compared to a 47% regional average, users have over two SIM cards per person on average.

Mobile ICT seems to have an appeal to the citizens and businesses, however, this is not so with the implementation of the SWS in the port of Abidjan. Public and private stakeholders do not appear to be determined for a speedy and full implementation of the SWS in the port of Abidjan (PAA, 2020). The higher mobile penetration may very well reveal that the targeted population embraced this ICT because of its direct positive impact on them and an effective marketing strategy that engaged them (Dutta & Lanvin, 2020). In other words, the lead agency and the implementing company must be able to demonstrate the benefits of the SWS for the

stakeholders' business to attract them. Taking the view that the implementation of fully integrated and paperless SWS in the port of Abidjan is new and may not be fully understood by both public and private stakeholders.

For the purpose of this study, the researcher focused on the implementation of SWS in the context of developing countries, particularly on West Africa using the port of Abidjan as a case study. Unlike most contemporary maritime issues on safety, pollution, and insurance, the implementation of SWS in West African ports has not been extensively explored especially in relation to the port of Abidjan.

Considering the contrast that exist between the benefits of SWS and challenges that are experienced by countries during its implementation, it appears clearly that its implementation requires a good understanding of the impact of critical factors negatively influencing SWS implementation at every implementation stage per stakeholder. Such understanding will help governments, the trade community, and stakeholders to adopt efficient strategies for implementing their SWS.

This sub-section highlighted the need for developing countries, particularly West African countries, to set up fully functional SWS for their development and the difficulties they encounter in achieving this. This information will enable future chapters and sections to provide a more detailed analysis of the critical factors that influence SWS implementation at each implementation stage and for each stakeholder. In the next sub-section, this study highlights the aim and objectives.

1.3 Aim

The aim of this research is to evaluate the criticality of factors influencing negatively SWS in the port of Abidjan at every implementation stage within the context of developing countries from stakeholders' perspectives.

1.4 Research objectives

In an attempt to fulfil the aim of the research, the study seeks to address the following research objectives:

First, it seeks to critically review and analyse existing theories relating to SWS implementation, which would enable the development of a framework for evaluating critical factors influencing SWS implementation within the context of developing countries.

Second, it seeks to identify critical factors at the different stages and key stakeholders involved in the implementation of SWS in the port of Abidjan.

Third, it seeks to define those critical factors that are specific to the port of Abidjan across the different stages of SWS implementation.

Fourth, it seeks to provide a framework for prioritising the criticality of factors influencing the SWS at every implementation stage per stakeholder.

1.5 Thesis scope

The purpose of this study is to evaluate the criticality of factors influencing SWS in the port of Abidjan at every implementation stage, within the context of developing countries from stakeholders' perspectives. Therefore, this study focuses on the port of Abidjan, which is the major point of imports and exports in Côte D'Ivoire.

The suitability of the port of Abidjan for this study is clarified by its association with the operation of the Ivorian SWS (GUCE-CI) and for the fact that 90% of international trade is done through the port of Abidjan (PAA, 2021). Thus, making it a major point of Côte D'Ivoire for the facilitation of international exchange.

The study examines the difficulties that influence the implementation of the SWS at every implementation stage per stakeholder. It is essentially limited to how to determine critical factors influencing SWS implementation in the port of Abidjan from stakeholders' perspectives.

This research delves into how the SWS is implemented in the port of Abidjan, the critical factors in its implementation, how those critical factors affect public and private stakeholders and the implementation process as a whole.

The study examined the case of the port of Abidjan from the period of launch of the Ivorian SWS in 2013 until May 2021.

1.6 Methodology approach

The SWS is a new phenomenon in West Africa particularly in Côte D'Ivoire, consequently there is a dearth of extant literature leading to an important gap in knowledge for academicians and decision makers. Therefore, using the interpretivist philosophical lens guided the selection of an appropriate methodological approach. This is because the phenomena of study, Single Window System implementation in the port of Abidjan and its embedding context, will be understood from people involved in its implementation and from contextual data related to such implementation (Kivunja & Kuyini, 2017).

Based on the philosophical stance and the research objectives, Stake's instrumental case study design was utilised (Stake, 2005; 2006; Mills, Durepos and Wiebe, 2010). This method was useful to explain “how” SWS is implemented within Abidjan Port, highlighting the critical factors that influence its implementation, and explain “why” it is taking the authorities so long to implement a fully paperless system (Piekkari and Welch, 2018; Eriksson and Kovalainen, 2015; Gehman et al., 2018). Additionally, using the case study method enabled third-party sources of data to be used for the triangulation of the data and methods (Stake, 2006; Boblin et al., 2013).

In-depth semi-structured interviews were conducted with fourteen stakeholders. Following Peterson (2017), this study builds on the notion that West African countries are struggling to implement fully paperless SWS, and hence there is the need to understand how critical factors influence SWS implementation (Kabui et al., 2019).

1.7 Contributions

This thesis has contributed to the understanding of the vast array of SWS implementation through the theoretical and practical contributions of the researcher. This study's contributions are of interest to scholars and decision makers of developing countries for the implementation of SWS in ports, because port authorities in order to facilitate international trade and remain competitive face a technological reform that they struggle to implement efficiently (Peterson, 2017). The study's contributions have relevance to theory and practice for scholars and port community stakeholders such as Port authorities, customs, ministry of trade, ministry of agriculture including shipping agent. The contributions to the theory and practice are detailed in chapter 7. In summary, this study makes the following contributions to theory and practice.

First, the study contributes to theory by adding new sub-categories (Lead agency's lack of clarity and inclusion and political instability) to the organisational context and the environmental context of the TOE framework, highlighting the critical factors influencing SWS implementation in the port as perceived by stakeholders. It was identified that SWS implementation in the port is influenced by technological, organisational and environmental context, which are consistent with previous research on technological adoption in organisations using the TOE framework.

Secondly, the study contributes to SWS implementation by proposing a framework of critical factors specific to the implementation of SWS at every stage per stakeholder. The proposed framework was developed by combining the TOE with other theories such as Single Window Implementation Framework, the SWS Road-map framework and the Comprehensive Barrier Framework. This framework appears to be the first to map together all these components, which have been validated through semi-structure interviews with fourteen different public and private stakeholders. The framework, by mapping critical factors at every implementation stage per stakeholder, will allow scholars and decision makers to determine which factors are critical for each stakeholder at every implementation stage of the SWS. Finally, in practice the framework will enable decision makers to prioritise their actions to minimise the impact of challenges in SWS implementation process. The background and rationale for this study, its objectives and contributions have been discussed. The structure of this thesis is summarised below.

1.8 Thesis structure

This thesis consists of seven chapters.

Chapter One - The aim and objectives of this research are explained, and the scope of research is defined. As part of chapter one, the researcher describes the brief background to the research context and discusses why this project was undertaken on the subject of SWS implementation in the port of Abidjan in the context of developing countries.

Chapter Two – This chapter relates to the underpinning theory comprising the review of existing literature in order to raise the cognizance of SWS concept and its characteristics. The researcher discusses the theoretical framework and factors, influencing SWS implementation. In addition, the characteristics of SWS in terms of benefits, challenges and risks were summarized and classified using the TOE categories. The researcher further introduces some e-Government theories that are applicable to SWS implementation including the Technological Organisational and Environmental (TOE) theory. TOE as the main theory is applied to inform the researcher in identifying and categorizing the factors and sub-factors that influence SWS implementation. Owing to its flexibility, the TOE has been combined with other theories such as the Comprehensive Barrier Framework, Single Window Implementation Framework and the SWS Road-map framework.

Chapter Three - The researcher addresses the research issues linked to the lack of a unified theoretical framework for understanding the significance of critical factors influencing SWS implementation at every implementation stage per stakeholder. Based on the research gap, the researcher developed a framework that is appropriate for this study. There, a framework was proposed to encourage better understanding of the implementation process and the various factors that impact on SWS. This proposed framework, will enable the researcher to use the

TOE theory in conjunction with other theories such as the Single Window Implementation Framework (SWIF) (UNECE, 2013), the SWS Road-map framework (UNECE, 2013) and Lam's (2005) Comprehensive Barrier Framework.

Chapter Four - The chapter highlights the methodology adopted in this thesis. It summarises the epistemological stance, explaining why the researcher choose interpretivism among other paradigms. The interpretivism paradigm has been adopted because it produces an understanding of the context in which the study is situated, as well as how the context influences information systems. The chosen paradigm also produces rich and subjective qualitative data (Walsham, 1995; Collis., & Hussey, 2009). In addition, the researcher rationalises the selection of a qualitative analytical approach since it fits into this inductive research stream and is considered the most suitable for a case study approach. Also, the research strategy and dimensions and the research design are discussed.

Chapter Five presents the findings of the study and the analysis of the various components according to the proposed framework presented in Chapter three. The research findings demonstrate that the identified critical factors are similar to those highlighted during the literature review, as shown in Chapter three. The results have also enabled the identification of additional factors that were not concealed in the proposed framework in Chapter three. Therefore, these analyses were necessary to simplify the researcher to discuss the research findings in the following chapters and make modifications where required.

Chapter Six - The researcher examines the criticality of the ten factors at every implementation stage of the SWS for each stakeholder interviewed. Based on the data collected during the interviews and document analysis, critical factors were prioritized and mapped to the various stages of implementation. Finally, in this chapter, the researcher revisited the proposed

framework based on the participants' responses. The proposed framework was revised prioritising the top four factors key to SWS implementation in the context of developing countries. The findings validated the framework as most of the respondents confirmed the critical factors put forward. They were able to make some practical and theoretical suggestions from the interviews.

Chapter Seven – This is the novel contribution chapter where the researcher, having mirrored the findings of the theoretical perspectives, presents the validated proposed framework, which was suggested for SWS implementation in developing countries, using the port of Abidjan (Côte d'Ivoire) as a case study. Although the framework was based on the Ivorian public and private stakeholders involved in the implementation of the SWS, the researcher offers some action plans for transferability of this research's findings to other developing countries in particular West African countries. Finally, the researcher summarises the research contributions (both theoretical and practical) and based on the research limitations; recommendations were made for future studies on SWS implementation.

Chapter Two Literature review

2.1 Introduction

This chapter analyses and reviews key literature on SWS. To begin the chapter, an introduction of the SWS was provided, including its definition and functionality in general. Section 2.3 introduces the various types of SWS that exist in a port environment, along with their features. In section 2.4, different SWS governance models are discussed, while section 2.5 discusses the need for business process re-engineering during SWS implementation. In section 2.6, the TOE framework is described as a suitable framework for this research. Next comes session 2.7, which presents previous studies that examined the critical factors influencing the implementation of SWS from various geographical regions and provides a list of the vital factors. Subsequently, SWS implementation sub-factors are discussed in Section 2.8. In sections 2.9 and 2.10, the researcher reviewed the technology adoption frameworks and theories relating to SWS implementation with a comparative analysis of the theories and frameworks. Finally, in section 2.11, the researcher discussed the need to propose a framework using the TOE framework as the primary guiding framework.

2.2 Introduction to SWS.

With advancements in Information Technology (IT), governments have improved their services dramatically. According to Keretho (2013), each change in IT brought new possibilities to transform the regulatory environment for international trade. In addition to the latest technology, one of the recent developments were a change in business philosophies and architectures that made trading more convenient and efficient. The emergence of the Single Window concept is one such development. UNECE (United Nations Economic Commission for Europe) defines the single window, as specified in UN/CEFACT recommendation number

33, as “a facility that allows parties involved in trade to lodge standardised information and documents with a single-entry point to fulfil all import, export and transit-related regulatory requirements”. Single Window is a philosophy of governance in which traditional government structures are transformed into new arrangements that best serve the needs of citizens and businesses, as suggested by Wang (2016). Under the Single Window’s approach, citizens and companies would receive government services through a single interface to government.

According to Joshi (2017), the complex, multi-agency organisational arrangements that go into the service delivery will be transparent to the consumers of the services, leading to increased efficiencies and reduction in the transaction costs of regulation. The Single Window concept has been around for some time in a few government areas, as suggested by Bajt & Duval, (2020). According to Bajt & Duval (2020), numerous organisations involved in trade facilitation have recognised and promoted the concept. Amongst these are the United Nations Economic Commission for Europe (UNECE) and its Centre for Trade Facilitation and Electronic Business (UN/CEFACT), World Customs Organisation (WCO), the United Nations Network of Experts for Paperless Trade and Transport in Asia and the Pacific (UNNExT), and the Association of Southeast Asian Nations (ASEAN). For instance, local governments in some parts of the world are offering a bouquet of citizen services under one roof through web portals and kiosks or citizen service centres (Tessmann and Elbert, 2022). Under this approach, different government departments reorganise their back-offices concerned with delivering individual services such as issuance of driving license, parking rights, benefits administration etc., into services provided under one roof. This re-organisation is aimed at causing the least possible inconvenience to citizens and meeting all their needs at a single service delivery point.

The electronic interface between such governments and citizens come in the form of citizen portals or websites and other access channels, as suggested by Gikonyo et al. (2019).

The same Single Window System (SWS) concept has been applied to the complex regulatory processes governing the clearing of goods in ports and transport mediums across international borders. SWS are essentially trade facilitation tools whose primary purpose is to simplify and harmonise processes associated with clearing and cross border movement of goods (MorosDaza et al., 2021). Single Window could be viewed as a collection of services provided by regulatory agencies to the actors in international trade. The Single Window operator manages value streams for the stakeholders through its services by using its technology and organisational resources. To produce the services, people, processes, information, and technology components are developed by the single window operator.

The Single Window environment comprises systems from Customs, Port authorities, Agriculture, Quarantine Services, Veterinary & Animal Health Services, Food Safety & Inspection Services etc. According to WCO (2015), the main themes of a Single Window are: (i) drive towards business simplification, (ii) co-ordinated approach to regulatory controls, (iii) trade facilitation using ICT techniques and (iv) Co-ordinated actions between Customs and other Government agencies. Single Window Environment involves the exchange of electronic documents (or information units) using standard communication interfaces between the trader's systems, government agencies and private stakeholders' systems. It is helpful to visualise the Single Window System as a collection of IT-driven business services, which form into non-overlapping categories and hierarchical structures, as suggested by Kabui et al. (2019).

The functions of the SWS as described above show its similarities with e-government services. In other words, based on the characteristics of the SWS, it can be assimilated into an e-government service. It is important to note that different types of SWS exist. However, in this study, the researcher is looking at the functionalities of the Ivorian SWS within the port of Abidjan, which is also referred to as Port Single Window (Guichet unique portuaire). The following section introduces the various types of SWS that exist in a port environment, along with their features.

2.3 Types and features of SWS for ports

According to Caldeirinha et al. (2022), Port single windows can be defined as a service that facilitates the exchange of standardised information and documents for the completion of all formalities related to the arrival, stay, and departure of vessels and the handling of goods from the arrival in port until their departure. The Ports Single Window Systems focus their objectives on information relating to ship calls in a country's ports, carriers and/or shipping agencies, ports, and in general to all the stakeholders involved in processing the merchandise in ports (Moros-Daza et al 2021).

The key stakeholders are not only the maritime and port authorities, shipping agencies and carriers, but also customs, which is a critical stakeholder in the process of removing goods (Tijan et al., 2019). The main objective for all of these stakeholders is to improve their process while encouraging the exchange of data and documents in an accelerated manner in addition to securing their revenues (Torlak et al., 2020). Depending on the scope of operations as defined by decision-makers, there are several types of Single Window Systems applicable to the maritime and port sector, as can be seen in Table 2.1 below:

Table 2-1 Types and features of SWS applicable in port

	Name of SWS	Mixed-use (functionalities)	Main purpose/ Use	Owner (development & operating)	Stakeholders
1	National Single window system (NSW)	Yes in some countries (CSW, MSW, PCS)	Managing and reporting tool for national statistics and to international institutions	National Government	Only national, regional, or local authorities
2	Customs single window system (CSW)	Only national & local Customs (including external declarations & releases)	Customs clearing & dues from import and export (or transit) of goods	National customs authority developed and managed	Local customs offices, carriers, Shipping agencies, Port Authorities
3	Maritime single window system (MSW)	Yes, for Customs, Ports, Health & info use to carriers, ports, & shipping agencies	Data on ships' calls in ports, via carriers and/or shipping agencies and/or ports (ETA, releases, ETD)	National Port Authority & sometimes private sector involved.	Ports, carriers, shipping agencies
4	Port community system (PCS)	No (some PCS go beyond traditional use for ports only, involve limited Port Terminals & Shipping Agencies)	Collecting ship ETA, calls, handling & ETD info within port area (port terminals, waiting births, ...) & releases and port dues	National and/or local Port Authorities (co-) developed / operated by private contractor owned/managed by local port authority)	Ports, port services, port terminals & shipping agencies & local Customs to access ship calls and ETA.

Source: IPCOEA (2021)

The Customs Single Window system, the Maritime Single Window system (MSW) and the Port Community System (PCS) can be integrated into a national single window system. In other words, depending on the objectives and the financial capacities of the decision-makers,

the Customs Single Window system, the Port Community System (PCS) and the Maritime Single Window system can be implemented under a national single window system, also called Single Window System for foreign trade, which is the case with Cote D'Ivoire (CI).

On the other hand, in Europe the emphasis is on the Maritime Single Window system (MSW).

Thus, the European Parliament and the European Council adopted Directive 2010/65/EU on 20 October 2010 regarding reporting requirements for ships arriving and departing from ports in the European Union (IPCSA, 2022). This legislation is more commonly known as the Reporting Formalities Directive (RFD). The RFD aims to simplify and harmonize administrative procedures related to maritime transport. The RFD required that Member States establish National Single Windows (NSWs), for the 14 reporting formalities outlined in its Annex, as of 1 June 2015 for ships arriving and departing from ports.

Since June 2015, ship arrivals at all German seaports have to be reported through the National Single Window and parts of this information can be accessed by other EU Members on request via SafeSeaNet (a European-wide data exchange system designed to prevent accidents and pollution at sea and to reduce their consequences) (Tijan et al., 2019). A sustainable seaport business requires involvement of stakeholders via MNSW, which the European Union is prioritizing. The reason for this is that, the MNSW would provide a basis for sustainable maritime transport and business by harmonising seaport business processes. Further, it could reduce administrative burden by harmonising and reusing information.

According to Tijan et al. (2019), the interest that the European Union has for the MNSWs is linked to the fact that in an environment where there are many different information systems, information exchange among seaport stakeholders can be a bottleneck to achieving sustainable goals. It is unfortunate that, contrary to the European Union's wishes, all member states do not

have yet access to the SafeSeaNet. This was confirmed by a refit evaluation of the RFD initiated by the European Commission. According to the support study, the RFD's objectives were not met (or were partially met) (IPCSA, 2022).

The above illustrates the complexities surrounding the implementation of single window systems in ports. It is therefore pertinent to examine the factors influencing SWS implementation in developing countries context using the port of Abidjan as a case study, which is the third largest port on the West African coast, behind Dakar and Lagos (PAA, 2021).

The three single window systems in Table 2.1 represents critical stages in implementing a national single window system in accordance with the single window road-map developed by UNECE (2013). As part of the study, the single window road-map will serve as a guide given that the Ivorian government uses it to implement its national single window, which includes the functionalities of a PCS, a customs single window system and a maritime single window system. The following section provides an overview of the various single windows business models.

2.4 Three Single Windows business models

The success of Single Windows business models are highly dependent on the initial conditions of the environment (political, economic, social, technological), as well as a good identification and management of preconditions prior to the start of the project (Jovic et al., 2021). As a result, it remains imperative that a detailed estimate of the costs of implementing Single Window be provided. To achieve this, Tijan et al. (2019) suggested that the Single Window business model should include all stakeholders to effectively identify all needs (infrastructure, equipment, human resources, training, communication, etc.). Furthermore, the Single Window model must guarantee the balance between the three levels of funding: setting up, operating,

and future sustainability (Aryee & Hansen, 2022). The three existing business models for SWS implementation are: the public financing model; the Public Private Partnership (PPP) model; the concession model (AACE, 2017).

2.4.1 The public financing model

Generally, this model is used when the funding for setting up, operating, and evolving the Single Window is provided by the government or a donor (Jovic et al., 2021). One of the reasons governments finance the various stages of a Single Window is to improve the foreign trade environment, especially through the facilitation of trade formalities and the good management of the Single Window (for instance, Kenya, Finland, South Korea, Sweden, the USA, Azerbaijan, Philippines, Tunisia) (AACE, 2017). In developing countries and least developed countries (LDCs), the absence of resources is one of the biggest risks associated with strong government involvement in the Single Window life-cycle as suggested by Peterson (2017). In such a situation, the Single Window could perform badly, and, where appropriate, private sector and donor involvement may be considered.

2.4.2 The PPP model

In this model, Single Windows are set up as part of a public-private partnership (Jovic et al., 2021). The PPP is limited to the governance and management of the project. This mutually beneficial partnership aims to improve the competitive environment of foreign trade in countries such as Ghana, Hong Kong, Japan, Malaysia, Mauritius, Senegal, Singapore, Cameroon, Morocco, Congo, etc. (AACE, 2017). It is generally the case that Single Window services are cost-based under PPPs. However, these are often negotiated or approved rates aimed at balancing the operation. As a complement to other types of funding available, PPP offers the flexibility of calling on the Government as a stakeholder, or on donors based on the

opportunity (IPCOEA, 2021). There are many models of the PPP espoused by the World Bank. However, for the purposes of the thesis we focus on two sub models namely the concessionary model and the BOT model. The rationale for focusing on these two models is because they were used in the port of Abidjan for various projects, SWS inclusive (Delmon, 2015).

2.4.2.1 The concession model

The concession model is a sub-model of the PPP model (Delmon 2010). After a public service concession is awarded, the private sector may finance the Single Window's setup, maintenance, and operation (e.g. Germany, Dakosy) (Jovic et al., 2021). It is crucial that the operation is profitable in this process. As a result, the facility provides paid services. Generally, concessionaires are paid directly by users based on provisions in their contracts with concessioning authorities. In reality, administrations may be limited in their control over this type of contract. It is then possible for concessionaires to extend the concession period as well as the schedule of charges (IPCOEA, 2021). As a result, the Single Window concessionaire may charge high prices for services provided. For this reason, the government should strive to ensure that the Single Window is cost-effective, by providing subsidies if necessary, but also by mobilizing donors to provide financing.

2.4.2.2 Build Operate Transfer model

Xenidis and Angelides (2005) argue that the build-operate-transfer (BOT) is an approach for developing infrastructure projects. BOT is a project delivery technique that enables a fast realization of public works in cases of a shortage of public funds. The process is inherent with risks, due mainly to the complexity and the number of stakeholders involved. However, Xenidis and Angelides (2005) assert that the identification, classification and presentation of a comprehensive list the risks will provide BOT project practitioners with a useful tool in the

effort of setting up successfully a BOT concession agreement. Delmon (2015) also asserts that the BOT approach to describing Private Public Partnerships (PPP) for new project assets captures legal ownership and control of the project assets. Under a BOT project, the private company owns the project assets until they are transferred at the end of the contract to the government or public agency. The extant literature asserts that such BOT projects are financed by forming a Special Purpose Vehicle (an SPV) which is independent from project developers or promoters. However, there are two major concerns derived from BOT project financing namely: (1) the return on investment for developers is measured through equity returns instead of the value of the firm or of the project since they fund the project by holding a significant portion of the shares of the BOT firm. (2) The BOT firm is subject to bankruptcy before the completion of the project. However, In instances where the equity of the BOT firm is publicly placed, the project development failures are likely to cause political costs (Ho & Liu, 2002). Thus, in the instance of the SWS the failures inherent with implementing the SWS has an impact on the political equity of the government.

2.4.3 Synthesis of business models

The various Single Window business models may be summarized as seen in Table 2.2:

Table 2-2 Summary of the various Single Window business models

Business Models		Set up Financing	Operation Financing	Evolution Financing
1	Public financed model	Donors/Government	Government	Donors/ Government
2	Concession model	Concessionaire	Concessionaire	Concessionaire
3	PPP model	Donor/Gov	Ad hoc entity	Ad hoc entity

Source: AAEC (2017)

2.5 Business Process Re-engineering for SWS implementation

A Single Window aims to transform manual procedures into a more seamless and secure information channel, without compromising the institutional stakeholders' prerogatives (Caldeirinha et al., 2022). Dematerialising procedures requires a business process analysis, which is the basis of IT system performance and operation (Kapkaeva, 2021). Without analyzing and re-engineering existing processes, the benefits of a Single Window System will be minimal and the flaws will remain (Moros-Daza et al., 2021).

Process analysis involves understanding the features of business processes and their interconnections, as well as clearly identifying the roles of any stakeholder (IPCOEA, 2021). In modeling of processes, each element of a business process is illustrated with graphic notations, which illustrate the following points:

Activities that come in a specific order and decision points; Stakeholders carrying out those activities; Inputs and outputs set for each activity, and related criteria and rules; Interconnection among stakeholders; Information flow throughout the company;

Quantitative indicators such as the number of stages as well as the time and cost necessary to complete a specific business process. The results from the business process analysis can serve as a starting point to implement trade facilitation measures such as, simplification of procedures; Simplification of document requirements and their alignment with international standards; Automation of international trade transactions and creation of electronic documents for the Single Window. By implementing these trade facilitation measures, a fully functional SWS can be established, which shows how important business re-engineering is to its implementation (Caldeirinha et al., 2022).

2.6 Adoption of the TOE framework as a guide to research.

There are various models used today in a practical or an academic setting to study the adoption of Technology in an organisation or at the government level. The technology developing industry seeks indicators that tell them what technology to develop and with which attributes through these studies. The technology-consuming organisation seeks information that helps create a successful change management process for technology implementation, and the technology user might seek a method to understand better which technology enhancement will best aid their working needs and working style.

According to Palladan (2018), business leaders attribute strategic importance to the successful implementation of technology, especially ICT. Therefore, the field of frameworks and theories that investigate successful technology adoption is broad and can be categorised in various ways. A categorisation based on the goal and focus of each approach is listed in Table 2.3.

Table 2-3 Common technology adoption theories

Diffusion Theories	User Acceptance theories	Decision making Theories (including problem solving theories)	Personality theories	Organisation structure theories
<p>- TEO theory (Technology, Environment, and organisation context).</p> <p>- Innovation Diffusion Theory IDT also called Diffusion of Innovation Theory DOI (Rogers 1962),</p> <p>- Technology Lifecycle Theory (Rogers 1962. Moore 1995)</p> <p>Focus on technology, on the environment and on the organisation</p>	<p>- Theory of Reasoned Action TRA (Ajzen and Fishbein 1973, 1975)</p> <p>- Theory of Planned Behaviour TPB (Ajzen 1991)</p> <p>- Technology Acceptance Model TAM 1; TAM 2 (Davis 1989)</p> <p>- Motivational Model (Vallerand 1997)</p> <p>- User Acceptance of Information Technology UTAUT (Vankatesh et al. 2003) Focus on the rational employee interest. (Marikyan & Papagiannidis, 2021)</p>	<p>Rational Choice Theory/ Game Theory</p> <p>Decision Making under Uncertainty</p> <p>Risk Management Change Management</p> <p>Media Richness Theory (Daft and Lengel 1984)</p> <p>Focus on the rational organisational/management interest</p>	<p>Technology Lifecycle Theory (Rogers 1962. Moore 1995)</p> <p>Nontechnology related approaches are:</p> <p>Social Cognitive Theories SCT (Compeau and Higgins 1995)</p> <p>Focus on the individual cognitive interest</p>	<p>Disruptive Technology Theory (Bower and Christensen 1995)</p> <p>Creative Destruction Theory (Schumpeter 1912, 1942)</p> <p>Focus on the strategic organisational interest</p>

Source : Hoti (2015)

The table highlighted above was sourced from Hoti (2015). As it has been presented in Table 2.3, there are several technology adoption models. Some models are widely used among practitioners, such as ‘the diffusion of innovation’ DOI, ‘the technology life-cycle theory’ and ‘the rational choice theory’. Others are more commonly used in the academic world, such as the theory of TEO (Technological, Organisational and Environmental Context), ‘the Theory of Reasoned Action’ TRA, ‘the Theory of Planned Behaviour’ TPB, ‘the Technology Acceptance Models’ TAM, and the unified model UTAUT (Hoti, 2015). After reviewing all the technology adoption theories in Table 2.3, the diffusion theories were identified as the most suitable theories to study the implementation of SWS in the context of developing countries using the port of Abidjan as a case study.

According to Awa et al. (2016) the constructs that make up TOE framework apply more to large enterprises where business continuity is assured than for SMEs. Nonetheless, they argue that TOE framework adequately addresses how innovation adoption unfolds in SMEs. The evidence in the extant literature affirms that *‘TOE framework has gained empirical validity across firm sizes and underpinned many ICT adoption inquiries, especially those that focus on interorganizational information systems’* (Awa et al., 2016’ pg. 6).

This research focuses on an adaptation of Hoti’s (2015) framework of the TOE because on a technological level, it explores the relative advantage, compatibility and complexity of SWS as a technological innovation. At the organisational level it encompasses four pillars. These include the level of support given the innovation by top management, the organizational readiness in terms of the financial and technical resources support, the intensity of information and product characteristics available for the innovation, and lastly the managerial time required to plan and implement the innovation. At the environmental level, it encompasses three pillars also. These include the competitive pressures from different industry stakeholders, the

government initiatives that encourage or suppress innovation adoption as well as the readiness of consumer segments (trading partners) to embrace innovations.

This study adopts Hoti's framework because it considers how the contrasting roles and purviews of different publics – particularly government, business stakeholders and other consumer publics within a given situational context are coordinated in the adoption and implementation of a new technological innovation. For this thesis, it provides the opportunity to identify and assess the criticality of factors across the domains of technology, organisation and environment that impact the implementation of new technology that has a significant impact on global trade. While acknowledging that Hoti's framework is conceptual and lacks empirical validation, the research argues that the boundary conditions of the framework is suitable for exploring the implementation of a complex technological product like a SWS within a complex situational context characterised by institutionally diverse organisations like the Port of Abidjan (Awa et al, 2016 ; Zhu and Kraemer, 2005). For instance, the public and private stakeholders involved in this study face the same challenges in implementing SWS within their departments as SMEs that seek to adopt new information systems from Hoti's explication. Furthermore, the private stakeholders used in this research fulfil the criteria of SME describe by Hoti (2015). This is not the same for the public stakeholders used in this study. Also, the SWS being implemented in the port of Abidjan is a relatively new system, which aligns with Hoti's examination of new information system adoption using the TOE framework.

As suggested by Oliveira & Martins (2011), the TOE framework has a solid theoretical basis and the potential for application in the IS adoption. In line with this argument, Hoti (2015) argued that the TOE framework includes the environment context (not included in the DOI theory), which enables it become a suitable framework for explaining public and private

stakeholders' innovation adoption and, therefore more complete. However, from the above discussion on the three models within the diffusion theories, the research deems Hoti's TOE framework suitable for identifying, assessing and classifying the critical factors and sub-factors (challenges and risks) influencing the implementation of SWS.

2.6.1 Previous studies on E-government initiatives

Hoti (2015) reports that many studies have examined the factors proposed in TOE to ascertain how they affect the adoption of electronic government initiatives. The TOE framework has also been used according to Reddick (2009), to investigate and test the factors that could affect the adoption of computer technology systems by local government authorities in the US and UK. The table below presents previous studies on e-government using the TOE framework.

Table 2-4 Previous Studies that Intersect with TOE Framework

References	Research subject	Findings (Critical factors influencing e-government)
Thompson et al. (2008)	Adopters and non-adopters of e-procurement in Singapore	Perceived direct benefits, indirect benefits, perceived costs, firm size, Top management support, Information sharing culture, Business partner influence
Hsiu-Fen et al. (2009)	Determinants of e-business diffusion	IS infrastructure, IS expertise, organisational compatibility, expected benefits of e-business, competitive pressure, trading partner readiness
Ming-Ju et al. (2008)	Determinants of adoption ERP	IT infrastructure, technology readiness, size, perceived barriers, production and operations improvement, enhancement of products and services, competitive pressure, regulatory policy
Srivastava et al. (2009)	E-government development	ICT infrastructure, technology development, human capital, public institutions, macro economy
Lippert & Davies (2006)	Web Services Adoption	Security concerns, reliability, deployability, firm size, firm scope, technological knowledge, perceived benefits, competitive pressure, regulatory influence, dependent partner readiness, trust in web service provider
Zhu et al. (2006)	Innovation Assimilation on e-Business	Technology readiness, technology integration, size, global scope, managerial obstacles, competition Intensity, regulatory environment
Kuan & Chau (2001)	EDI Adoption	Perceived direct benefits, perceived financial cost, perceived technical competence, perceived industry pressure, perceived government pressure

2.6.2 Suitability of the TOE for SWS implementation research

Tornatzky and Fleischer (1990) presented a comprehensive framework for understanding technology adoption in the organisational context. A model defining the “context for change” consisting of three contexts has been highlighted by DePietro et al. (1990). Within the technological context, DePietro et al. (1990) have used the technological factors initially identified by Rogers (1983). The technological context encompasses all of the available technologies relevant to the company; these include those currently in use at the company and those that are available in the marketplace but not in use. Within the organisational context, the organisation’s characteristics and resources are considered including its organisational structure and communication processes. The environmental context identifies government pressure, competition among stakeholders, and information availability. The three contexts, often referred to as “TOE,” are posited to influence the adoption of technological innovations in organisations. According to Hoti (2015), many authors used the TOE framework to understand the adoption of different information systems (IS) such as Electronic Data Interchange (EDI) (Kuan and Chau, 2001) (Lippert and Govindarajulu, 2006) and E-Commerce (Martins and Oliveira, 2009). The following figure illustrates Tornatzky and Fleischer’s (1990) TOE theoretical framework:

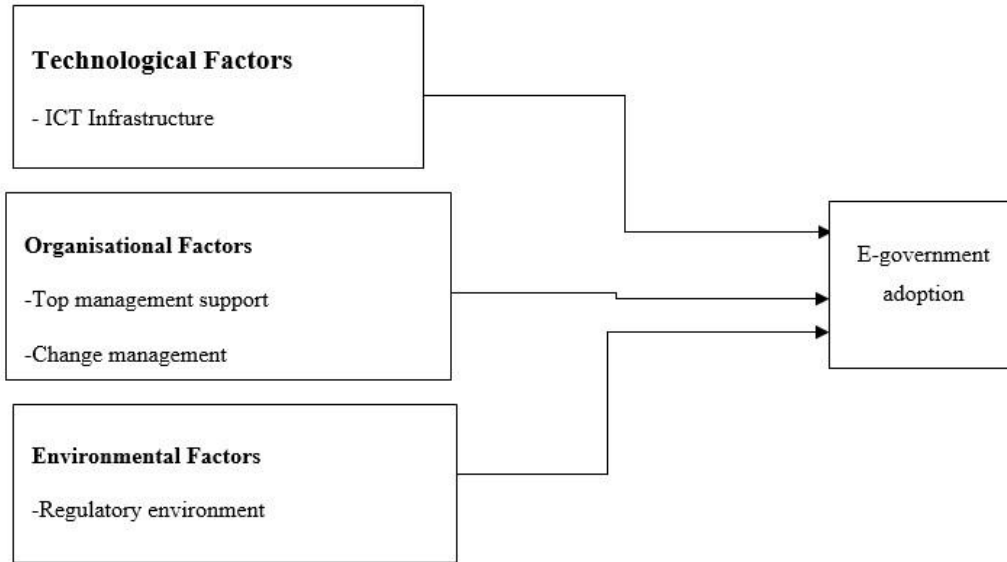


Figure 2-1 Conceptual model TOE Framework (Tornatzky and Fleischer 1990)

Cahill et al. (1990) assert that the TOE framework is a helpful starting point for understanding the technological, organisational, and environmental factors affecting the adoption process of technological innovations in any organisational context. Kraemer and Perry (1989) indicate that the “configuration of hardware, software applications, individuals, and procedures which together comprise information system technology in any organisation is a “complex package,” which is highly unique and differentiated among and between public sector organisations with varying purposes, charters, resource levels and access to technology.” Cahill et al. (1990, p.59) further emphasise that the "unique" combination of these three factors give greater explanatory power than any single category of factors for understanding ICT adoption processes in numerous government settings. Therefore, this makes the TOE framework suitable for our study on the implementation of SWS in the port of Abidjan, considering the similarities between e-government projects and SWS services as seen in section 2.2. In this research, the TOE framework was used to inform the identification and categorisation of both the factors and sub-factors that influence SWS implementation.

2.7 Previous studies on Critical factors influencing the implementation of SWS from different geographical regions.

2.7.1 Protocol

To provide a better understanding of the critical factors influencing SWS implementation in ports, a comprehensive literature review was conducted. It followed an adaptation of Dreyer et al. (2019) typology for conducting a literature search. Figure 2.2 shows the methodological steps of the search.

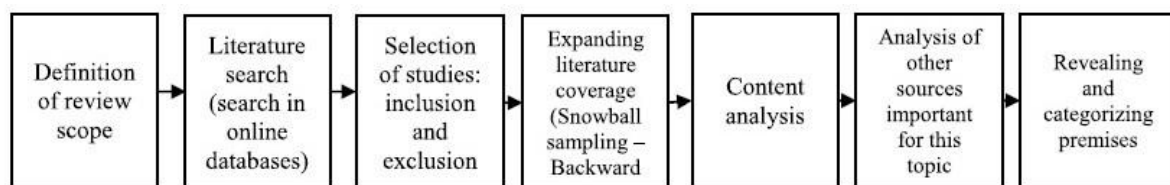


Figure 2-2 Methodological steps of the search (Dreyer et al., 2019)

The search was carried out using mainly the following research databases: Web of Science (WOS) and Scopus. The paper search focused on the following keywords:

- Port community system
- Digitalisation in port
- Maritime single window system
- Customs single window system
- Supply chain

For the purpose of identifying the most relevant articles, the inclusion and exclusion criteria listed in Table 2.5 had to be determined. In addition, the snowball sampling phase was used to expand the number of relevant primary studies (Myllarniemi, 2015).

Table 2-5 Inclusion and exclusion criteria for search

Inclusion Criteria		Exclusion Criteria
Topic/Article title/Abstract/keywords	Topic or Title in WOS; Article title, Abstract, and Keywords in Scopus	Papers that mention digitalization in ports to a small extent, and do not focus primarily on it
Fields	-Port community system -Digitalisation in port -Maritime single window system -Customs single window system -Supply chain	Papers on shipbuilding industry, ship design, maritime and shipping law.
Categories for general keywords:	“Port”, “Supply chain”, “Transportation”, “Logistics”, “Interoperability” “Stakeholders integration and collaboration”.	Papers that explicitly referred to the law of the sea.
Limitation	No limitation to high-ranking periodical publications	Non English language
Types of literature	Journals, conference papers and book chapters, reports, thesis	

As shown in Table 2.5, the research focused on Topic or Title in WOS, and on the Article title, Abstract, and Keywords in Scopus.

For general keywords such as “Digitalisation”, which can be used both in the ICT (Information Communication Technology) and maritime transport, the search was limited to the following categories: “Port”, “Supply chain”, “Transportation”, “Logistics”, “Interoperability” and “Stakeholders integration and collaboration”. Furthermore, as suggested by Dreyer et al. (2019), the search was not limited to high-ranking periodical publications. Beside journals, the

researcher also considered conference papers and book chapters. The exclusion criteria were applied to papers in which digitalization in port was mentioned even though it was not the main focus (Hirata, 2019). Papers on shipbuilding industry and ship design, and papers that explicitly referred to maritime and shipping law were also not considered further. Furthermore, non-English-language sources were excluded as well, in order to avoid the tentative regional overrepresentation of research (Dreyer et al., 2019). After the described filtration, a total number of 85 papers were further analysed.

Considering the scarcity of research on SWS implementation in ports, a further 24 sources (such as reports and dissertations) related to maritime transport (MTS) and e-government were also included. These sources do not necessarily contain the selected keywords, but they are related to the factors identified as influencing SWS implementation. Figure 2.3 shows the selection process followed to assess the eligibility of the included papers. The full list of all papers reviewed (85+24) is shown in Appendix 13.

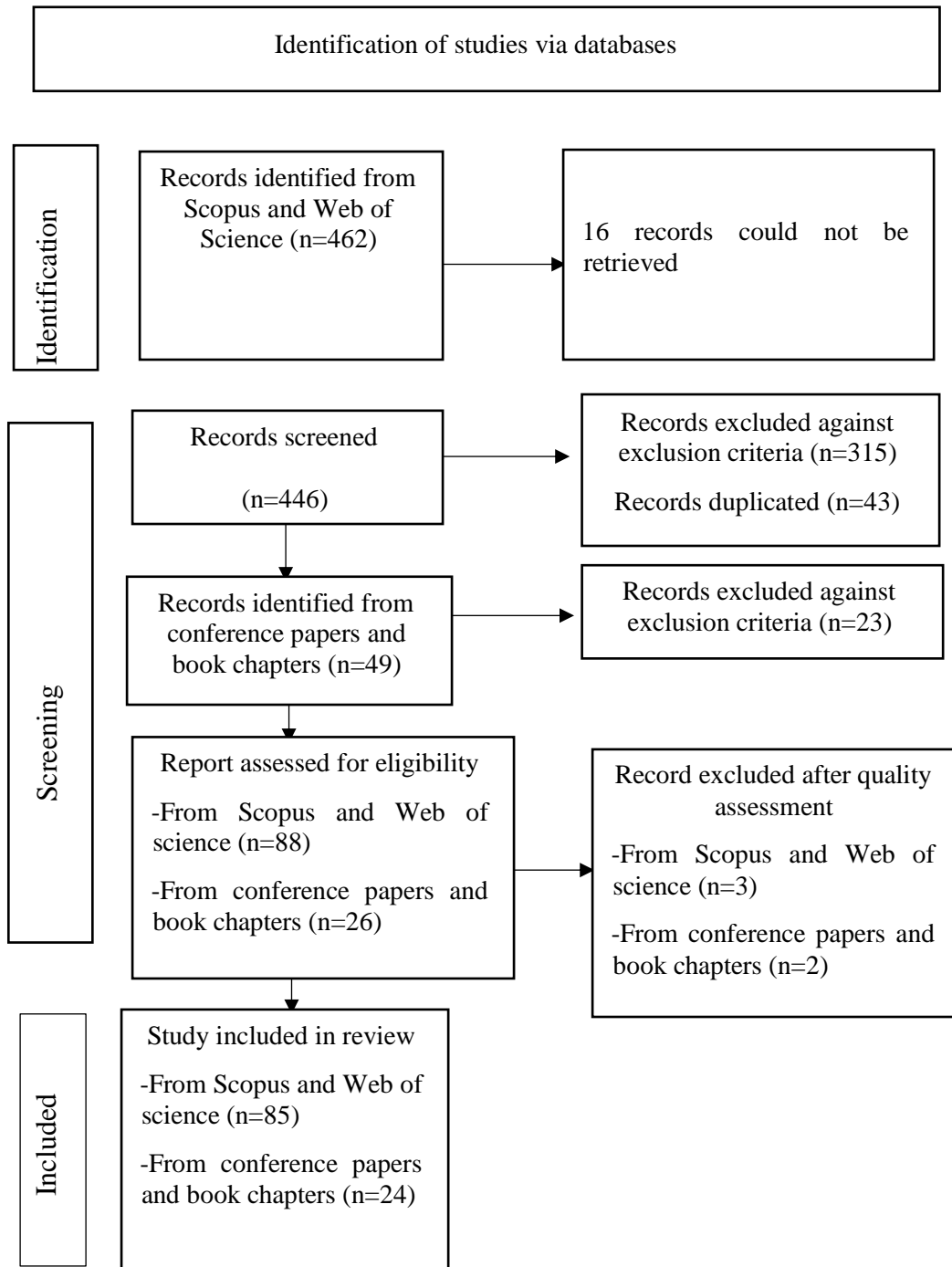


Figure 2-3PRISMA flow diagram, adapted from (Page et al., 2021)

The table 2.6 below shows some publications found in the systematic search and snowball sampling. These publications are among the most recent in the field of single window system and were referred to most often in this research.

Table 2-6 Publications found in the systematic search and snowball sampling.

	Author	Article	Journal	Type of study	Focuses	Method and theory used
1	(Caldeirinha et al.,2022)	Port Community Systems: Accelerating the Transition of Seaports toward the Physical Internet— The Portuguese Case	Journal of Marine science and Engineering	Quantitative	This paper focuses on evolution guidelines of PCSs and the PCS business factors that can drive the supply chain into a significant improvement in performance.	A survey was sent to a sample of Portuguese supply chain experts. The survey used the Likert-7 as a variable scale (from “1–not important” to “7–very important”). .Confirmatory structural equation modelling methodology (SPSS/AMOS) was used to evaluate the contribution of each Business Factor to the endogenous variable of the future supply chain performance.
2	(Jovic et al, 2021)	Port Community System Business Models	Conference: Digital Support from Crisis to Progressive Change.	Qualitative	This study analyse different models of introducing an integrated Port Community System in seaports and the importance of collaboration among stakeholders for a successful implementation of the PCS.	Literature review and actual cases in some of the most prominent seaports. Using described methodology, a total of 36 resources have been identified and used in the description of development and exploitation models of a PCS.
3	(Caldeirinha et al.2020)	The impact of port community systems (PCS) characteristics on performance	Research in Transportation Economics	Quantitative	The purpose of this study is to assess the effect of the port community system (PCS) and its influence on port performance.	A survey was sent to a sample of Portuguese supply chain experts. The techniques of principal component analysis and structural equation modelling are applied to 153 valid responses from a sample, obtained from Portuguese port community experts.

4	(Torlak et al., 2020)	Analysis of port community system introduction in Croatian seaports - case study Split	Transactions on Maritime Science 9(2), pp. 331-341	Qualitative	This study is an overview of the development of a PCS in the Republic of Croatia. It also analyses the involvement of the stakeholders of the seaport system and the transport chain.	Literature review and interviews. In this paper, the analysis of seaport stakeholders and Maritime Single Window systems in Croatia is performed, including NSW (National Single Window), MNSW (Maritime National Single Window: CIMIS - their interaction and development of the national model for a PCS.
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5	(Aryee & Hansen, 2022)	De-politicization of digital systems for trade facilitation at the port of Tema: A soft systems methodology approach	Case Studies on Transport Policy Open Access Volume 10, Issue 1, Pages 105 – 117	Qualitative	This research explore the meanings embedded in controversies surrounding the implementation of the Ghana National Single Window (GNSW) and port expansion project and how these meanings help explain port stakeholder fears, hopes and expectations at the Port of Tema.	This study adopted the Soft Systems Methodology (SSM) as a learning process for understanding port stakeholders' relations and attitudes. It combined SSM with interviews, media content analysis and focus groups made possible by snowballing
6	(Kapkaeva et al., 2021)	Digital Platform for Maritime Port Ecosystem: Port of Hamburg Case	Transportation Research Procedia 54, pp. 909-917	Qualitative	In this paper authors describe main informational systems in Hamburg port using DAKOSY system solutions. This experience is very important for further analysis, business enhancement or transformation and can be a good example for other ports transformation	For analysis in this paper AP development architectural framework TOGAF (The Open Group, 2011) was chosen. It defines a detailed algorithm for the design of the access point and provides reliable documentation, and also has sufficient degree of flexibility. The TOGAF methodology supports four architectural domains that make up the overall enterprise system.
7	(Moros-Daza et al 2020)	Port Community Systems: A structured literature review	Transportation Research Part A: Policy and Practice 133, pp. 27-46	Qualitative	This study reveals that the extant PCS literature is criticised for its inertia, as it tends to be overly comfortable with legacy PCS, ignoring the fact that it needs to evolve and adapt to new markets, responding to emerging economies' growth or expanding functionalities with new technologies.	A structured literature review on PCS was performed in this study. It used a proposed evolution framework and a taxonomy to obtain a detailed and current worldwide PCS inventory.

8	(Moros-Daza et al 2021)	Port community system design for emerging economies: Case study Barranquilla, Colombia	Proceedings of the International Conference on Industrial Engineering and Operations Management pp. 308-318	Qualitative	This research aimed to evaluate the most used design methodologies based on key factors and propose a new match methodology specific for PCS developments, taking as a case study the port community of the Colombian Caribbean Coast.	This study proposed a new design methodology called Match for the design and development of a PCS. The proposed methodology includes the following methodologies: knowledge Management; Concurrent Engineering; Design Thinking; NADI.
9	(Tessmann and Elbert, 2022)	Multi-sided platforms in competitive B2B networks with varying Governmental influence – a taxonomy of Port and Cargo community system business models	Electronic Markets 32(2), pp. 829-872	Quantitative	This study develops a taxonomy to classify special B2B-MSP with varying governmental influence in the supply chain and transportation context, viz. Port and Cargo Community Systems (CS)	This study develops a taxonomy to classify special B2B-MSP with varying governmental influence in the supply chain and transportation context. For a better understanding of different CS (Community Systems) business models and to verify the applicability of the taxonomy, this study used a cluster analysis to identify relevant CS archetypes.
10	(Jiang et al. 2021)	Exploring the impact of port-centric information integration on port performance: the case of Qingdao Port	Maritime Policy and Management	Quantitative	This study explores how information integration afforded by the recent development of Port Centric ICT systems (PCIS) may impact port performance.	A survey was conducted in Qingdao Port. This study used a partial least squares structural equation modelling (PLS-SEM) analysis to test the mechanism of information integration on port performance among the port community members.
11	(Aryee et al. 2021)	The social-political embeddedness of import clearance: 20 years of digital transformation at Tema, Ghana	World Customs Journal 15(1), pp. 3-14	Qualitative	This research aim is to understand how stakeholder interests affect decisions and outcomes in the introduction of digital platforms in the port of Tema.	This study used a multi-case studies based in the port of Tema, Ghana, where stakeholders have divergent opinions about technology, which causes conflicts. The study employed the theory of sociotechnical systems, to identify the frictions and interlinkages of non-technological factors.
12	(Joshi 2017)	Prospects and Problems of Single Window System implementation in India.	IJEMR- Vol 7 Issue 09.	Qualitative and Quantitative	This study identified the challenges influencing the SWS implementation in India in the perspective of the stakeholders, such as industrialists, banks, carriers, customs and insurance of and rank them using a Likert scale.	A survey was conducted among various stakeholders using the SWS in India. This study used Likert-Scale to rate factors influencing SWS in India.

13	(Kabui, et. Al. 2019)	Effect of Single Window System Procedures on Cargo Clearance Efficiency in Kenya: A Case for Mombasa Port.	European Journal of Business and Management (Vol.11, No.24).	Qualitative and Quantitative	This study identified the challenges influencing the SWS implementation in the port of Mombasa during cargo clearance. Likert Scale is used to rank the challenges.	A survey was conducted among various stakeholders using the SWS in the port of Mombasa. This study used Likert-Scale to rank factors influencing SWS implementation.
14	(Agbozo, 2017)	Going paperless in the public sector: an exposition on Ghana's ports.	Journal of Scientific and Engineering Research, 8(9), 2229-5518.	Qualitative	-Review of the paperless SWS in the port of Tema (Ghana), to identify the difficulties encountered by the system.	A structured literature review on SWS implementation in the port of Tema was performed in this study.

2.7.2 Findings from the systematic literature review

2.7.2.1 A critique of the traditional aspect of SWS

The extant port centric SWS literature is criticised for several reasons. A major reason pertains to its inertia, as the literature has tended to focus more on the legacy aspects of SWS. The resultant effect is that the literature has ignored the fact that current studies on SWS need to examine how the system needs to evolve and adapt to new markets, or respond to emerging economies' growth or expanding functionalities with new technologies as suggested by MorosDaza et al. (2020).

The research contends that scholars should emphasize the importance of SWS as a tool for facilitating port integration in global supply chains. This is because the role of ports nowadays has transcended the basic function of transshipment to become a place for value added logistics, as discussed by Caldeirinha et al. (2022). Since global supply chains are expanding, the traditional role of ports has changed from providing transshipment services to providing integrated logistics services and efficient product distribution across supply chains, according to Tessmann and Elbert (2022). Furthermore, considering that global supply chains are

becoming increasingly complex, Jiang et al. (2021) believe ports should act as central nodes in information and organization networks instead of only being global logistics hubs. This expansion of the role of ports can be sustained through an effective implementation of a SWS, which can facilitate seamless communication, eliminate time wastage, reduce cost in operations through the Just-In-Time concept, encourage interoperability of modal infrastructure and operations, provide value added services and customer satisfaction (Kapkaeva et al., 2021).

According to Moros-Daza et al. (2020) port centric SWS research must focus on addressing practical needs and foster collaboration among practitioners and scholars. Tijan et al. (2019) has addressed the issue of the need for an effective collaboration among stakeholders for a successful implementation of SWS in port. Furthermore, as suggested by Torlak et al. (2020), collaboration and participation of port and logistic players, is one of the most important characteristics of SWS implementation in port, which has a high effect on port performance.

Moros-Daza et al. (2021) agree on the fact that port communities are part of a very specific and complex market, which is influence by key factors such as: the context, the geographical environment, the technological development, and the culture. In addition to these factors, it is worth noting that the port services included in the port community system are limited to the digitization of ship and cargo paper processes, not by redesigning and simplifying processes or by developing new services that complement modern logistics chains, fulfilling their demands for transparency, automation and decision-making (Caldeirinha et al. 2020).

The SWS in a port is the technological platform that enables networking between the public and private agents and entities involved in the ship and cargo services offered by ports (Caldeirinha et al. 2020). PCS are community-owned systems with heterogenous stakeholders

that include terminal operators, carriers (ocean, road, and rail), freight forwarders, enforcement agencies (i.e. customs), port authorities, and various lobby groups (including workers' unions, environmentalists, and other policymakers) (Kapkaeva et al 2021). However, the SWS literature (Bajt, et al 2020; IPCOEA, 2021; Peterson, 2017) confirms that SWS platforms have mostly failed to produce the intended results in developing countries. The popular reason for the failure are resistant to technology and lack of strong political will (Aryee, Andersen, & Hansen, 2021). For instance, according to Aryee (2021) in Ghana, the introduction of the Single Window platform and building an ultra-modern terminal at the Port of Tema had raised scepticism among stakeholders and resulted in several controversies involving Government, shipper representatives, labour, and private organizations.

2.7.2.2 Assessment of challenges that developing countries face with implementing SWS

In discussing the reasons for SWS failure, the extant literature have emphasized several related factors (Wang, 2016; Joshi, 2017; Abeywickrama et al., 2015; Agbozo, 2017; Kabui et al., 2019) referred to as critical factors (Ashaye, 2014; Moatshe, 2014). For Joshi (2017), the single window concept facilitates trade and transport and economic development and social welfare in a developing country such as India. Similarly, the observations of Joshi on Indian ports apply to the port of Abidjan. Côte d'Ivoire is a developing country whose authorities have not necessarily identified the specific critical factors that need to be considered to effectively implement the SWS. For this reason, Côte d'Ivoire is still struggling to implement an entirely paperless SWS in its ports. One of the reasons for this is that critical factors are not specific enough for stakeholders in West African ports to act on. Thus, one of the objectives of this study is to develop a more comprehensive and detailed list of critical factors for SWS

implementation in the port of Abidjan. This list will include the critical factors that have the most significant influence on implementing a fully paperless SWS in the port of Abidjan.

There are few studies on the factors influencing the successful implementation of SWS in ports from the perspectives of various stakeholders, including freight forwarders, customs, port authorities, carriers etc. According to Peterson (2017), in most Sub-Sahara African (SSA) countries, the national single windows coexist alongside paper-based systems, diminishing the time and cost savings that the former provides. The latter may occur where countries lack adequate information technology to implement an electronic single window fully or in countries that must first establish a supportive regulatory environment to bypass traditional paper-based systems, as suggested by Peterson (2017). In other words, Côte d'Ivoire, like many sub-Saharan African (SSA) countries, lack enough information technology to deploy an electronic single window completely paperless and must first develop a favourable legislative framework to circumvent existing paper-based methods (IPCOEA, 2021). It can be learned from previous studies that the Single Window Systems introduced in some countries in West Africa, including Côte D'Ivoire, is not yet entirely paperless. This thesis explores the possibility of deploying a SWS that is entirely paperless in the port of Abidjan and other West African ports.

Furthermore, Agbozo (2017) argues that the implementation of the Single Window System in the port of Tema saved both public and private operators time and money. Yet, Agbozo (2017) revealed that ICT infrastructure was a significant factor in affecting this implementation despite the gains. This is a valid observation for most developing countries. For instance, Kambui et al. (2019) in their study on the benefits of implementing SWS in the port of Mombassa, Kenya revealed that the Kenyan SWS was not fully automated. Their study highlighted the necessity for the Kenyan government to establish an effective ICT

infrastructure and a legal framework to achieve an entirely paperless system. Hence, the researcher argues that it is essential to pay attention to the ICT infrastructure in the context of Sub-Saharan African countries, as is the case with the port of Abidjan, where some of the limitations of the SWS implementation is the insufficient internet capacity in the country and the fact that SWS is not fully automated.

In addition to internet capacity, Mwajita (2016) argued that successful SWS implementation depends on the alignment of trade and ICT strategies with existing international trade and customs policy and regulatory frameworks. She further noted the importance of change management, which she emphasizes, must be addressed from the outset. This adjustment between policy and regulatory frameworks and trade strategies goes hand in hand with government action. This reason may account for why Sri Lanka's adoption of the SWS has not seen significant progress in its implementation. According to Abeywickrama (2015), the process has suffered from challenges related to critical factors such as government support, the role of the lead agency, organisational effectiveness, and change management. To remedy the situation, Abeywickrama (2015) suggest that government officials and high-level decision makers must be actively involved in building political will and promoting inter-agency collaboration to address these factors.

Thus, in advocating for the importance of political will, the thesis aligns with the findings of Joshi's (2017) case study in India, which revealed several benefits of implementing a SWS. In this study, he reveals three critical factors that impact the successful implementation of SWS: strong political will, a sound legal framework, and security and privacy. In the same vein, Wang (2016) highlighted the role of different stakeholders in implementing a SWS in the port environment in South Korea. In his article, Wang (2016) calls for selecting a lead agency that can effectively coordinate the different phases of SWS implementation. Wang (2016) suggests

that the customs administration would be the ideal lead agency capable of galvanising other stakeholders for a successful SWS implementation.

Other studies highlight financial resources as an essential critical factor. In his research on SWS implementation in developed and developing countries, Peterson (2017) emphasises this point by revealing a gap between poor and rich countries in terms of capacity to implement SWS. This point can also be considered a priori as a critical factor for the case of the port of Abidjan, given that Côte d'Ivoire is a developing country. Developing countries, particularly those in Sub-Saharan Africa, such as Côte d'Ivoire, struggle to obtain sufficient financial resources to build their SWS. This is one of the reasons for the slowdown in the SWS implementation process in the country.

In summary, the review of the extant literature on SWS implementation within developing countries reveal that previous studies on SWS lack the consideration of technology adoption theory to provide a guiding framework of challenges and risks influencing the implementation of SWS. Given the role played by the SWS in promoting international trade by attracting foreign capital and accelerating economic development, developing country governments should take steps to improve the process of policy implementation, while developing the infrastructure to ensure the success of the single window policy (Joshi, 2017). In the context of economic development, the concept of SWS should be broadened to include activities such as business-to-business trade, transportation, logistics, and components used as single-window platforms. As a result, it will be easier to provide information exchange services between private sector units in trade, transport, and logistics. As shown in Table 2.7, the factors influencing single window implementation in ports are identified by region. The regionalization of factors can be explained by the fact that factors that influence the implementation of single window systems in ports differ by region, as suggested by Peterson

(2017). Unlike developed countries, developing countries face more difficulties digitalizing import-export procedures, according to Peterson (2017). Table 2.8 describes the identified factors.

Table 2-7 Studies on the critical Factors influencing the implementation of SWS from different geographical regions

	Literature Sources	Regional countries	Government support	Lead agency role	Change management	Partnership & collaboration among stakeholders	Security and privacy	Top Management support	Financial resources	Legal framework	ICT Infrastructure
Africa	(Aryee & Hansen, 2022)	Ghana	✓	✓	✓	✓		✓			
	Agbozo (2017)	Ghana	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Kabui et al., (2019)	Kenya			✓	✓		✓			✓
Europe	(Caldeirinha et al., 2022)	Portugal	✓	✓	✓	✓	✓	✓	✓	✓	✓
	(Caldeirinha et al., 2020)	Portugal	✓			✓			✓		✓
	(Jovic et al., 2021)	Croatia		✓	✓	✓		✓			
	(Torlak et al., 2020)	Croatia	✓	✓	✓	✓				✓	
		Germany	✓	✓	✓	✓				✓	
	Tosevska-Trpcevska, (2014)	Macedonia	✓	✓	✓	✓				✓	
	(Tessmann and Elbert, 2022)	Germany	✓	✓	✓	✓				✓	

Middle east & Far East	(Jiang et al. 2021)	China			✓	✓		✓			
	-Asghar sarafizadeh & Morteza rahmani (2014)	Iran			✓	✓		✓			
	Joshi, (2017)	India	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Abeywickrama & Wickramaarachchi (2015)	Sri-Lanka	✓		✓		✓	✓	✓	✓	✓
	Yousef & Azzeh (2017)	Jordan			✓		✓			✓	✓
	Wang (2016)	South Korea	✓	✓		✓					
South America	(Moros-Daza et al 2021)	Colombia	✓	✓	✓	✓	✓	✓	✓	✓	✓
	(Moros-Daza et al 2020)	Colombia	✓	✓	✓	✓	✓	✓	✓	✓	✓

Organisational, and environmental context (TOE).

Table 2-8 Mapping of factors influencing SWS with TOE context

Category	Factors
Technical context	ICT Infrastructure
Organisational context	Top management support
	Change management
	Lead agency role
	Financial resources
Environmental context	Legal Framework
	Government support
	Partnership & collaboration among stakeholders
	Security and privacy

In addition to identifying and classifying the critical factors that affect SWS, the researcher will also determine and classify in the next section the sub-factors that influence SWS implementation worldwide, using the TOE framework as one of the vital relevant theories to inform this research. The sub-factors will be classified according to benefits, challenges, and risks and will aid the researcher in gaining a deeper understanding of the factors. The sub factors are linked by definition to the factors. Unlike previous studies on SWS, this study uses sub-factors to give a deeper understanding of how each critical factor is negatively influencing the implementation process of SWS.

2.8 Single window implementation sub-factors: Benefits, Challenges and risks.

2.8.1 Benefits of SWS implementation

Since the main aim of this study is to evaluate the critical factors affecting SWS implementation, challenges and risks are the key sub-factors to be taken into account. Nevertheless, this research mentions the benefits of SWS to understand how useful and essential SWS is in ports. SWS is generally perceived as an enabling tool for increasing efficiency and enhancing transparency. Various applications to stakeholders have helped facilitate reform and collect more revenue (Aryee et al. 2021). As observed by Kabui et al. (2019), SWS holds the potential to reduce the complementary use of information systems in public and private entities comprising both operational and strategic services. Jovic et al. (2021) argue that the quest to implement SWS is motivated by policy goals of increased effectiveness, efficiency, and information quality, improved interaction mechanisms, and in turn, better governance tools. According to Joshi (2017), the Single Window enhances the authenticity and availability of information and, in doing so, simplifies and expedites the flow of information between regulatory authorities and traders, reduces fraud and harmonises the exchange and sharing of data between the public and private stakeholders. This will overall enhance trade and bring many benefits to all stakeholders in import and export transactions.

The adoption of SWS services are essential in reducing corruption, increasing transparency, creating convenience, increasing revenue and cost reduction. SWS also reduces the discretion and flexibility of civil servants and alters accountability. It forces information sharing since services would be available online for all to access and provides more straightforward and quicker access to organisational knowledge to all employees, thereby flattening the hierarchy. Ndou (2004) supported the need to explore SWS services when he summarises the

opportunities such as cost reduction and efficiency gain; quality of service delivery to business and customers; transparency, anti-corruption and accountability; increase the capacity of government; network and community creation; improve the quality of decision making; & promote the use of ICT in other sectors of the society.

“As far as most developing countries are a concern, emphases are laid on opportunities such as transparency, anti-corruption, accountability, cost reduction and efficiency gains and promoting the use of ICT” (Kabui et al., 2019).

As mentioned above, there have been several benefits of Single Window Systems documented in academic publications, with jurisdictions that have established SWS registering an increase in revenue collection due to reduced TTCs and improvements in cross-border efficiencies. The benefits of SWS can be considered from the views of stakeholders participating in the logistics supply: Government agencies involved in international trade; Port, logistics and transport operators and Traders engaged in international trade (importers, exporters, customs brokers, shipping agents, freight forwarders).

□ Classification of SWS implementation benefits

A review of the literature suggests that SWS benefits could be classified under the following concepts:

2.8.1.1 Technical context

According to Hamed (2009), the technical benefit of SWS includes the capacity offered to stakeholders of a real-time basis source of data and trade facilitation statistics, which permit to retrieve data efficiently, analyse and report it. In other words, the technical benefits of SWS

implementation are enormous; it helps improve the management of internal data, it increases the reliability and accuracy of data sharing; it reduces error in data collection, process, and storage, as suggested by Wang (2016).

2.8.1.2 Organisational context

As a result of SWS implementation, scholars have found a positive impact on the effectiveness of the organisations' policy in addition to a reduction in the time required to complete transactions (from days to minutes). According to Peterson (2017), SWS facilitates the reorganisation of administrative functions and processes and monitors public and private stakeholders' performance. It eases the pressure that could occur in public and private entities due to queuing or aligning in waiting rows. Because of its flexibility, it improves the efficiency of operations and the growth in public esteem for the various stakeholders, as suggested by Kabui et Al. (2019).

2.8.1.3 Environmental context

Apart from transforming public and private stakeholders internally, SWS implementation can improve the stakeholders' external relationships as suggested by Abeywickrama (2015). A review of literature has enabled the classification of the environmental benefits under the following: Through a single integrated SWS portal, stakeholders can access and transact using government services online or through an automated system. "There is an improvement of revenue collection for import and export by both the public and private sector; also, security throughout the various business processes can improve due to the streamlining and harmonisation of data" Agbozo (2017). Another benefit is the ability for both public and private actors to attract additional investments and business projects from overseas.

Table 2-9 The classification of SWS Implementation Benefits

Category	Subcategory	SWS Benefits	References
Technological context	Technical	<p>SWS transforms the existing services and expands the new service delivery.</p> <p>It allows the provision of portability between systems, Data sharing and build trust.</p> <p>SWS reduces data collection process and increase storage capacity of data.</p>	(Hamed, 2009; Al-Azri et al. 2010).
Organisational context	Financial resources	SWS reduces the cost of doing business for public and private stakeholders.	(Ifinedo, 2006; Almarabeh & AbuAli, 2010).
Environmental context	External	<p>SWS improves external relationship with private stakeholders.</p> <p>It digitises procurement services from and to the business sector, allowing a better management and control of government procurement system.</p> <p>SWS improves collaboration among public and private stakeholders; and reduce the risk of doing business. - It attracts more foreign direct investments and business projects.</p>	Joshi (2017); Agbozo (2017).

2.8.2 Challenges influencing SWS implementation Worldwide.

In addition to identifying and classifying the critical factors that affect SWS, the research also identified and classified the sub-factors that influence SWS implementation negatively worldwide, using the TOE framework as one of the critical relevant theories to inform this research. The sub-factors that influence SWS implementation negatively are classified according to challenges and risks and were useful in aiding a deeper understanding of the critical factors identified through the literature review. The sub-factors are linked by definition to the critical factors.

In the context of this study, it was decided to dissociate challenges and risks because risks are not the same as challenges. An important distinction between the two is that challenges are foreseen or envisaged issues that must be resolved during the implementation of the SWS. Contrastingly, risks are spontaneous or sporadic issues that occur and which have the potential

to negatively impact a process; in this case it can negatively affect the implementation process of the SWS. Risks can affect anything: people, processes, technology, and resources. The risks and challenges commonly have a negative impact on the SWS project.

According to Peterson (2017), developed countries experienced fewer or no challenges in implementing their SWS, unlike developing countries, where predominantly SWS implementation is plagued by numerous challenges. In addition, SWS in developing countries has mainly not developed to the stage of a fully integrated paperless system (Peterson, 2017). At the same time, most developed countries have advanced to the phase of a fully integrated and paperless system. For example, Singapore, South Korea, Sweden, Canada, and Malaysia are making significant strides in the SWS total transition and transformation phase and offering multiple diversity of complete online transactions capabilities and services as suggested by IPCOEA (2021). Also, developed countries exhibit higher efficiencies and advancements in e-democracy, e-participation and e-citizens, while in developing countries, the position is the opposite. Both developing and developed countries' SWS experiences reveal observable disparities in the critical factors influencing the implementation of SWS in those countries.

According to Bajt et al. (2020), developing countries face significant levels of uncertainty in developing and providing SWS services because of the complexity of the technology, deeply entrenched organisational routines, and the great diversity in the acceptance of technology by individuals. This asserts that SWS implementation requires much more than ICT infrastructure for developing and operating successful online services but includes developing strategic approaches for organising and assembling tangible resources such as computers and networks and intangible resources such as employees' skills, knowledge and organisational processes.

In addition to this, poverty and a lack of infrastructure are other significant limitations hindering the adoption and use of ICT in developing countries (Portulans, 2020). The position of developing countries and African countries in particular compared to developed countries depict challenges that need to be overcome. According to Martínez-Zarzoso (2020), successful implementation of the SWS in Africa would require better strategies, policies and devoted political will to avail resources and change laws to ensure that public and private stakeholders have easy access to the SWS platform. These gaps could continually and largely contribute to SWS projects' failures in developing countries if they are not mitigated with research-based mitigation strategies. According to Peterson (2017), implementing SWS in developing countries is challenging particularly in sub-Saharan countries. SWS promotes representative and participative democracy, transparent, open, and collaborative decision making, close relationships between public and private stakeholders, enhanced service delivery, new infrastructure convenience, and equitable distribution of government services to citizens, as suggested by Agbozo (2017).

The sections below classify the sub-factors (Challenges and Risks) influencing SWS implementation as follows: Technological, Organisational, and Environmental context (TOE).

□ The classification of SWS implementation challenges

The classification of SWS implementation challenges is illustrated in Table 2.11 below and has a review of previous research work. For simplicity, the researcher has classified SWS implementation challenges factors into the following: Technological, Organisational, and Environmental contexts.

2.8.2.1 Technological context

According to Nkohkwo & Islam (2013), the technical challenges of implementing SWS include inconsistency as technology changes from time to time, inadequate communications, and networks; lack of a telecommunication network; and lack of reliable networks; Lack of maintenance of stakeholders' websites. Additionally, existing systems may be too complex or incompatible with new systems. According to scholars and practitioners such as Mundy & Musa (2010), having employees with relevant IT skills are essential for SWS implementation, the absence of which could lead to drawbacks. These constraints could be the following one or more of the following: dependence on foreign technical know-how; shortage of well-trained IT staff in the market (Almarabeh & AbuAli, 2010; Al-Rashid, 2012).

2.8.2.2 Organisational context

Organisational barriers to SWS implementation impact its effectiveness. According to Joshi (2017) these relate to lack of support from top management and leadership; Resistance to change from personnel; lack of transparency. Financial matters are essential to any SWS implementation, and delayed completion could negatively impact the cost. Financial and human capital investments need to be made if SWS is to flourish. Other financial challenges are as follows: “cost of accessing the internet; high cost of IT professionals and consultancies; cost of installation, operation and maintenance of ICT systems; and cost of training and system development” (Nkohkwo & Islam, 2013).

2.8.2.3 Environmental context

Security has always been a significant challenge in implementing SWS services successfully. According to Alshehri et al. (2012), there is the need to keep personal data private and

confidential, not used for other purposes, as a general distrust of the single window platform can undermine confidence and provoke a delay in the implementation of the SWS. These barriers include confidentiality, lack of security and privacy of information on stakeholders' websites. "The threats from viruses, worms and trojans; lack of users' trust and confidence to employ SWS services; unauthorised external and internal access to systems and information; No assurance that transaction is legally valid; lack of security rules, policies and privacy laws; inadequate security of government hardware and software infrastructure; and lack of proper risk management in place". (Lambrinoudakis et al., 2003; Joia & Lemos, 2010; BeynonDavies, 2005; Alshehri et al., 2012; Nkohkwo & Islam, 2013; Joshi, 2017).

Table 2-10The classification of SWS implementation challenges

Category	Sub-Category	SWS challenges	References
Technological context	ICT	-Shortage of reliable networks and communication.	Mundy & Musa, 2010; Nkohkwo & Islam, 2013; Portulans, 2020
	Infrastructure	-Lack of telecommunication network. -Lack of standards and communication architecture policies and definitions. -Difficult access to ICT. -Lack of compatibility between systems of different organisations. -Maintenance of government and private organisations websites. - Existing systems either being complex or not compatible with new system. -Technical staff lack of program knowledge. -Shortage of well-trained IT staff in market;	
Organisational context	Top management support	-Lack of political will. -Lack of leading Agency. -Deficiency of clear and sufficient implementation guidelines. -Change management and human capital development. -Non- contextualisation of SWS practices. -Lack or insufficient collaboration between Government and private stakeholders, -Lack of evaluation framework, transparency and cultural issues. -Resistance to change by high level management. -Time consuming for reengineering or complexity of business processes in public and private organisations.	Abeywickrama et al., 2015; Joshi 2017.

	Financial Resources	-Shortage of financial resources in public sector organisations. -High cost of IT professionals and consultancies. -Cost of installation, operation, and maintenance of ICT systems. -Cost of training, system development & internet access	Mundy & Musa, 2010; Alshehri et al., 2012; Nkohkwo & Islam, 2013)
Environmental context	Competition environment	-Lack of collaboration among public and private stakeholders.	Gil-Garcia et al. 2008; Al-Rashid, 2009; Almarabeh & AbuAli, 2010
	Government regulation	-Non-existence of Law on the protection of personal data and electronic transactions. -Non-existence of Law on electronic signature -Non-existence of Law on cybercrime and cryptography	Joshi, 2017; Bajt, et al., 2020; Abeywickrama, et al., 2015
	Security and privacy	- Fear of confidentiality breach -lack of security and privacy of information in stakeholders' websites. -Threats from viruses, worms and Trojans. -Lack of private stakeholder's trust and confidence to use SWS services. -Lack of security rules, policies, and privacy laws. -Lack of proper risk management in place	Alshehri et al, 2012; Nkohkwo & Islam, 2013; Kabui et al, 2019.

2.8.3 Risks influencing SWS implementation

It has been observed from the literature that there is a need to discuss the risks involved in the implementation of SWS. In fact, according to literature, risks are deeply embedded in social, economic, and political principles. Most of the previous research studies have focused mainly on the benefits and challenges, either collaboratively or separately; however there has been little emphasis on the risks of SWS implementation, even though the environment and type of SWS to be implemented would determine the magnitude of the peril involved. Hence, the researcher has made an effort to discuss and classify the risks of SWS implementation in the following sub-section. "Risk identification and management are paramount features of

successful IT project management” (Cagliano et al., 2015: pg. 236). SWS implementation risks have been classified under technological, process, people, organisational and financial categories (see Table 2.12).

□ Classification of risks influencing SWS implementation

2.8.3.1 Technological context

A technological risk of implementing SWS could be dependence on foreign technical knowhow to fully operate the technology. However, because of the widespread lack of IT skills in most developing countries, “software and personal computers vendors would have an ultimate say on the design of the infrastructure” (Peterson, 2017). In addition, if the security level reduces in the country due to war or civil unrest, it may provoke the sudden emigration of critical experts and maintenance personnel, as suggested by Peterson (2017). Other risks envisage: “Risk of failure or uncertainty of new technologies, and fear of duplication of similar services across departments” (Ciborra and Nevarra, 2005; Peterson, 2017).

2.8.3.2 Organisational context

a. Organisational

Organisational risks could be misinterpretation and misuse of SWS services, inferior service quality, or increased criticisms by private stakeholders, as suggested by Choi (2011) and Lam (2005).

b. Financial

According to Eddowes (2004), financial matters and funding are essential for any SWS services to be successfully implemented. Lack of funds could lead to a delay or eventual abandonment

of projects (Joshi, 2017). “There is also the risk of financial sustainability so that after implementation, the project is properly managed and last longer” (Eddowes, 2004: pg. 57).

2.8.3.3 Environmental context

a. People

According to Choi, (2011) SWS implementation risks would include the following: Reduction in manpower; increase in unemployment; and more corruption as a result of the front-line service being delegated to intermediaries thereby leading to lack of transparency and accountability.

b. Security and Privacy

Weerakkody et al. (2013) defined privacy as the absence of unreasonable, and potentially intrusive, collection and use of personal information. “Privacy is more of a social consideration, whereas security is more of a technical consideration” (Abdallah & Fan, 2012: pg. 358). Scholars have therefore emphasised on the need to provide to SWS services with the different levels of confidentiality, integrity, and availability, which are requested, for the different users regardless of their literacy in electronic information technology. Scholars have attributed this to the lack of security, which could lead to cyberattacks or identity thefts (Abdallah & Fan, 2012; Weerakkody et al., 2013).

Table 2-11 The classification of SWS implementation risks

Category	Sub-Category	SWS implementation Risks	References
Technological context	Technology	-Dependence on foreign technical know-how. -Risk of failure. -Tech skills gap	Matavire, 2010; Abdallah & Fan, 2012; Bajt, et al., 2020
	Organisational	-Reduction of full control over information. -Inferior service quality. -Delay services -More corruption if front office functions are delegated to intermediaries -Misinterpretation and misuse of SWS services.	Abdallah & Fan, 2012; Weerakkody et al., 2013. Mwajita, 2016. Nowak, 2014
Organisational context	Financial	-Limited or lack of funding during especially implementation. -Financial sustainability	Wang, 2016; Nowak, 2014;
	People	-Increase in unemployment	Bajt, et al., 2020; Choi, 2010
Environmental context	Security and Privacy	-Identify theft. -Cyber- attacks/ Hacking	Bajt, et al 2020. Abdallah & Fan, 2012.

2.9 Overview of Technology adoption models and theories relating to SWS implementation

2.9.1 Diffusion of Innovations Theory (DOI)

Rogers (1983) proposed the diffusion of innovation theory. Essentially, it is concerned with the transference of knowledge and technology or the evolution of an old idea. It has potential application to information technology ideas, artefacts, and techniques. The approach may also be applied to information technology artefacts, techniques, and ideas. In addition to the twostep flow theory, diffusion theory explains the stages through which a technological innovation passes as follows: knowledge (exposure to its existence and understanding of its functions);

Persuasion (the forming of a favourable attitude to it); Precision (commitment to its adoption); Implementation (putting it to use); and Confirmation (reinforcement based on positive outcomes from it). (Rogers,1983),

Diffusion research has focused on five elements: the characteristics of an innovation that may influence its adoption; the decision-making process that occurs when individuals consider adopting a new idea, product, or practice; the characteristics of individuals that make them likely to adopt innovation; the consequences for individuals and society of embracing an innovation; and the communication channels used in the adoption process.

Research on innovation diffusion has attempted to explain why and how users adopt new information mediums, such as the Internet. It has been argued that some of this theory's elements would need to be extended and modified for application to technology transitions, in general, and information systems, in particular. In addition, the theory tends to overlook how competition, marketing mix variables, competitive advantage, resource allocation and how they might influence the speed and pattern of diffusion in alignment with the product life cycle.

2.9.2 Single window system road-map model

The Single Window System (SWS) road-map framework Figure 2.4 illustrates how SWS is implemented. In other words, the SWS road map shows the different implementation stages and the key actors at every implementation stage. Based on UNECE (2013), there are five distinct but overlapping stages of maturity of a Single Window System. The framework provides insight into the current state of the economy and is an effective tool for prioritising and setting objectives, either for improvement or for moving to the next level. The SWS roadmap framework can help achieve the primary goal of this study, which is to develop a framework that evaluates the significance of critical factors in the implementation process of

SWS in the port of Abidjan as a developing country context. In addition to this, the implementation of the SWS in the port of Abidjan is based on the SWS road-map framework. This lends support to the current research emphasis on utilising the essential component of roadmap to craft the framework. According to the extant literature, the implementing company followed the different implementation stages as specified by the SWS road-map framework proposed by UNECE (2013). Thus, by applying the framework to this study, it was possible to identify the various stages of implementation of SWS in the port of Abidjan and the key stakeholders involved at each stage, as shown in Table 2.13.

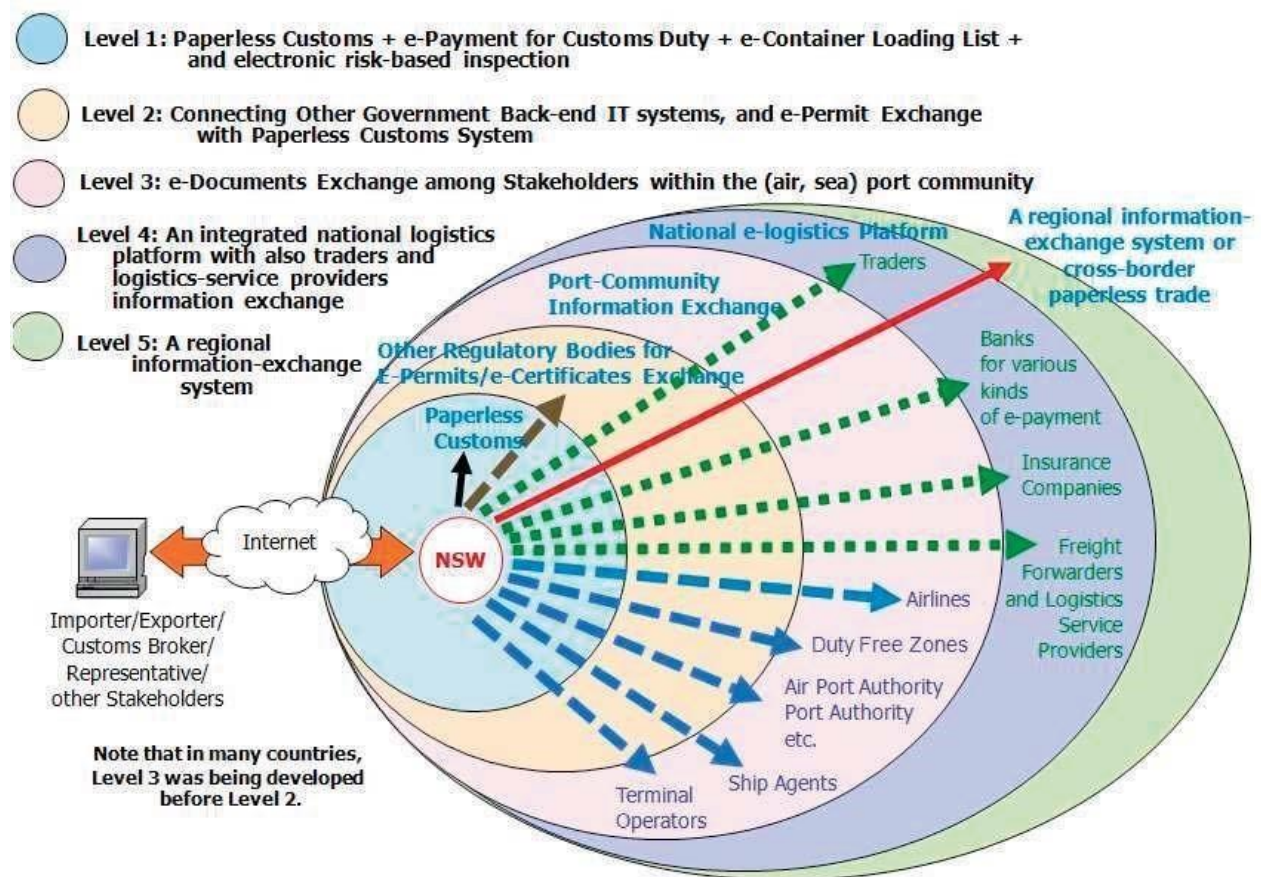


Figure 2-4A Single Window System Road-map in five evolutionary development stage (UNECE, 2013)

The evolution of the Single Window implementation can be described in five incremental development levels, as illustrated in Table 2.13.

Table 2-12A Single Window Road-map in five evolutionary stages (UNECE 2013)

Stages	Goals	Functionalities	Countries	References
Stage 1	Paperless Customs	Online duty payment, electronic risk assessment and risk-based inspection strategies, electronic container loading documents to electronically associate between Customs declarations and physical containers of those declared goods, and some basic electronic information exchange between Customs Department and terminal operators for facilitating and speeding up customs release operations at the port or at the border area.	Belize, Chile, Estonia, Pakistan, Turkey, Thailand etc...	WCO (2015); UNECE (2013); Ndonga (2015)
	e-Payment for Customs Duty			
	Container Loading List			
	Simple e-Documents Exchange with Port Authority and/or Terminal Operators			
Stage 2	Connecting Other Government Back-end IT systems,	Issuance of electronic import/export-related permits and certificates and their exchange between Government agencies.	Malaysia; South Korea; Singapore (TradeNet)	Keretho (2013). UNECE (2013); ESCWA (2011)
	e-Permit Exchange with Paperless Customs System			

Stage 3	e-Documents Exchange among stakeholders within the (air, sea, dry) port community	<p>-The system optimizes, manages, and automates smooth port and logistics procedures through a single submission of data and by connecting transport and logistics chains.</p> <p>-Connects to the customs single window system (ASYCUDA) and to other regulatory authorities</p>	Germany (DAKOSY system); Singapore (PortNet); Finland etc	Wang (2006); IPCSA (2020)
Stage 4	An integrated national logistics platform with also traders and logistics-service providers information exchange	-Connects traders, customs, other regulatory authorities, banks, customs brokers, insurance companies, freight forwarders and other logistics service providers.	South Korea (K-U trade)	Wang (2006); IPCSA (2020)
Stage 5	A regional informationexchange system	Exchange of sanitary, phyto-sanitary, & certificate of origin among countries.	<p>-Exchange between New Zealand.</p> <p>-Exchange between South Korea & Hong Kong</p>	Wang (2020). IPCSA (2020).

2.9.3 Single Window Implementation Framework (SWIF)

The Single Window Implementation Framework (SWIF) simplifies the process of decomposing the UNECE's Single Windows System (SWS) into 10 components as seen in Figure 2.5 below. Essentially, decomposition refers to the systematic breaking down and structuring of Single-Window System challenges into smaller and more manageable components. Thus, SWIF is an essential tool for overcoming SWS implementation challenges. It simplifies the tasks required to implement SWS, thus helping overcome the challenges. The SWIF gives each component an objective and deliverable, along with a description of how each component can be developed. As a result of analysing these ten components, the author was able to identify relevant factors affecting the implementation of SWS (see Table 2.14).

Table 2.13: Ten key activities of SWS throughout the development life cycle with the relevant factors influencing it implementation

	Key activities of SWS implementation	Relevant factors influencing implementation	SWS
1	Stakeholder Requirements Identification and Management	Lead agency role	
2	Stakeholder Collaborative Platform Establishment	Partnership & collaboration stakeholders	among
3	Single Window Vision Articulation	Lead agency role	
4	Business Process Analysis and Simplification	Lead agency role	
5	Data Harmonisation and Documents Simplification	ICT Infrastructure	
6	Service Functions Design (or called Application Architecture Design)	ICT Infrastructure	
7	Technical Architecture Establishment including Standards and Interoperability	ICT Infrastructure	
8	Legal Infrastructure Institution	Legal Framework	
9	Business and Governance Models Enforcement including Finance, Implementation and Operation Governance	Financial resources	
10	IT Infrastructure and Solutions Execution.	ICT Infrastructure	

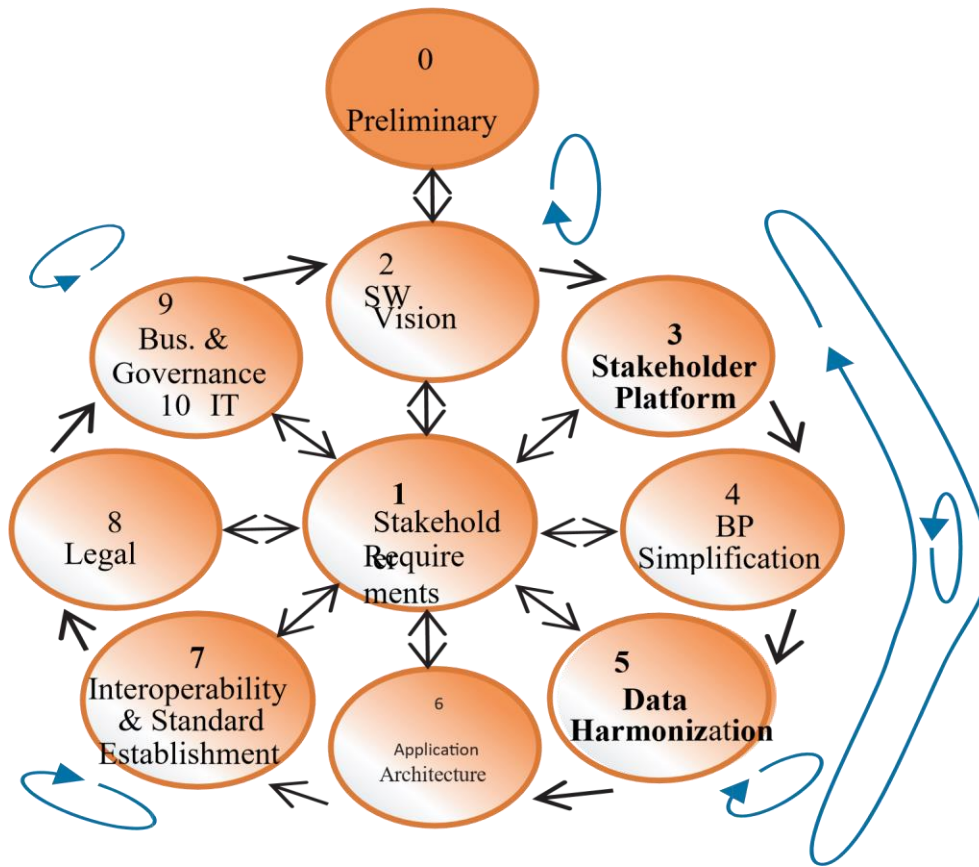


Figure 2-5 Single Window Implementation Framework (UNECE, 2013)

2.9.4 Comprehensive Barrier Framework

Lam (2005) developed this framework of barriers to e-government integration, which are classified into strategy, technology, policy, and organisational domains. Comparing Lam's (2005), technological, policy and organisational categories is akin to the TOE's categories. Additionally, given the similarities between E-government and SWS, as discussed in section 2.2, this study also aims to identify barriers to SWS implementation. As a result, this comprehensive barrier framework proved to be relevant to this study.

2.10 Comparative Analysis of Technology Adoption Theories and Models

According to (Hoti, 2015), most empirical studies on technology adoption or information systems (IS) are concerned with the "Diffusion of Innovation" or the "DOI" theory of Rogers, as well as the TOE model. According to many researchers, DOI can be used to identify "perceived" critical features of technological innovations (such as relative advantage, compatibility, complexity, observability and trialability) that may influence the attitude of potential adopters or rejecters of Information Systems (IS). However, it was argued that Roger's model should also be combined with other considerations or factors to achieve a comprehensive approach to adoption.

Moreover, the Diffusion of Innovation (DOI) theory has been criticised for not generating hypotheses that can be readily refuted. Rather than look at how services are diffused to citizens, the research focuses on how e-Government is implemented from the perspective of the government and employees. Additionally, scholars such as Witchel (2004) have criticised the theory for undervaluing the influence of the media and the notion that it is linear, and source dominated because it interprets communication processes from the perspective of the elite who decides how to diffuse information or innovations.

Concerning this argument, it was found that the TOE framework incorporates the environment context (not included in the DOI theory), thus becoming better able to explain intra-firm technology adoption and, therefore, more complete, as Hoti (2015) suggested. According to Oliveira and Martins (2011), the TOE framework has a solid theoretical basis and the potential for application in the Information System (IS) adoption. A review of all theoretical approaches

to technology adoption led to the selection of diffusion theories as to the most helpful model for studying the SWS implementation in the port of Abidjan. From the two (2) models within the diffusion theories (Table 2.3), TOE was selected as the best framework for identifying and grouping the critical factors and characteristics influencing the implementation of SWS in the port of Abidjan.

The Single Window Implementation Framework (SWIF) is used in this research to identify the relevant critical factors for each component of SWS implementation (UNECE, 2013). The Single Window System (SWS) road-map framework by the UNECE (2013) complements the SWIF framework in this study. The SWS road-map outlines elements of the implementation of SWS not considered by SWIF. An example of an SWS road-map is shown in Figure 4. It illustrates the different levels of implementation and the various key stakeholders at each level. For the author to achieve the objectives of this study, the inclusion of these elements is vital.

Lam (2005) developed a comprehensive barrier framework for evaluating e-government projects as a checklist for studying information systems. In the study, e-government integration barriers were classified into four categories: strategy, technology, policy, and organisation. This article discusses the nature of e-government services that necessitate closer cooperation between government stakeholders. Considering the similarities between e-government and SWS, the use of this framework in this study appears justified. It enabled the author to identify potential obstacles during the implementation of the SWS. Thus, this framework is useful in identifying the critical factors for SWS implementation.

Table 2.15 below presents a comparative analysis of the various frameworks and theories in this literature and their relevance to SWS implementation. Based on the gaps identified from relevant literature, as well as the frameworks and theories already discussed in this chapter, the

research aimed to conceptualise a framework by adapting the existing theories of technology innovation adoption and SWS frameworks discussed above . The goal was to identify and prioritise the critical factors influencing SWS implementation based on their criticality, following the interviews with various stakeholders and then conceptualise the proposed model, which is presented in the next chapter.

Table 2-13Comparative analysis of the various theories and models

Framework/Theory		Key features relevance to SWS implementation		Criticism
1	TOE	<p>The TOE framework was developed in 1990 (Tornatzky and Fleischer 1990).</p> <p>The TOE framework identifies three aspects of a firm's contexts that influence the adoption and implementation of technological innovation, namely technological, organisational and environmental aspects (Tornatzky and Fleischer 1990).</p>	TOE, as a qualitative method, can be used to identify and group factors, challenges and risks influencing the implementation of SWS in the port of Abidjan.	<p>According to Baker (2012), the TOE aligns too closely with other technology adoption theories and fails to offer competitive explanations.</p> <p>Furthermore, Ramdani., et al (2009) suggested, the TOE framework has limitations as a glossary of variables that are not well integrated or well developed and requires more research on how organizations can adopt it. That notwithstanding, the framework was chosen because of its flexibility and adaptability. This enabled us to adapt the framework to include new factors which was useful in highlighting the peculiarities of the SWS.</p>
2	SWIF	The Single window implementation framework (SWIF) was developed by UNECE (2013). It provides a development methodology along with objectives, activities, and deliverables to plan and oversee the implementation of the Single Window System.	The Single Window Implementation Framework (SWIF) will help identify the relevant factors, which influence the SWS, during the ten stages of development identified by UNECE (2013). The framework is therefore relevant for this research study.	The SWIF framework only focuses on breaking down and structuring the implementation process into 10 manageable component. However, it does not match the different aspects of the implementation process to the five stages of SWS implementation. It is more focused on how to technically implement the SWS.
3	The Single Window System (SWS) Road-map Framework	The Single Window System (SWS) Road-map framework is developed by UNECE (2013). It shows five different implementation stages and the key actors at every implementation stage of the SWS.	The Single Window System (SWS) Road-map framework illustrates five distinct stages of maturity of a Single Window System, which were followed by GUCE-CI. Therefore, applying this framework will assist in identifying the different stages and key actors during SWS	The SWS road-map framework does not adequately cover all the aspects of the implementation process. For example, The SWS road-map framework is only focused on the different implementation stages and the key stakeholders involve at every implementation stage.

			implementation in the port of Abidjan.	
4	Diffusion of Innovation (DOI)	The Rogers (1983) Diffusion of Innovation theory proposes a method of transferring knowledge and technology or evolving an old idea. It consists of four stages: invention, diffusion (or communication) through the social system, time, and consequences.	DOI examines the ways in which e-government services are diffused to citizens, which isn't the focus of this study. Several IS research projects use the DOI as their theoretical basis; however, some of its components must be extended and modified to be applied to technology transition and IS in general.	The theory must be extended and modified to be applicable to technology transitions, in general, for instance ports transitioning to an SWS. It does not have the environmental category
5	Comprehensive Barrier Framework	This framework was developed by Lam (2005). Lam's study revealed a broad set of barriers to e-government integration and classified them into strategy, technology, policy, and organisation domains.	Applying the Comprehensive Barrier Framework will assist in the recognition of critical factors and characteristics that affect effective implementation of SWS. The framework will therefore be relevant for this research study.	The Comprehensive Barrier Framework has the same three categories of factors as the TOE but is not as flexible or adaptable as the TOE. Regardless of its lack of flexibility, it was useful to help identify critical factors based on the specified classifications under each category.

2.11 Towards proposing a framework for SWS implementation

There is limited research and few theoretical frameworks on technology adoption regarding SWS implementation. Specifically, to the researcher's knowledge, there is no research explicitly identifying critical factors, challenges and risks influencing SWS implementation negatively from process stages and stakeholders' perspectives in the port of Abidjan. The literature review indicates that many of the previous research studies have discussed the challenges that have been encountered during the implementation of SWS worldwide. In this research, the researcher intends to use a combination of different frameworks and theories (Table 2.15) in developing a framework for SWS implementation. Currently, there is no

framework that maps out the critical factors, challenges and risks together. It could be argued that public and private stakeholders will benefit from having a holistic view of SWS implementation.

Stakeholders would also benefit from a step-by-step guide in the form of a frame of reference on identifying and mapping critical factors influencing SWS implementation, which is not currently available. This research would simplify comprehension of the essential factors if it included implementation risks. The benefits of SWS are discussed in this study. Still, it is essential to remember that it primarily focuses on the challenges and risks, which are elements of the identified factors. As a result, the challenges and risks identified in this study are related to critical factors that influence SWS implementation.

Researchers have reported that the SWS initiative would result in a wide range of challenges and risks for both public and private stakeholders in developing countries. Therefore, in the following chapter, the research will propose a framework to address the research gap by identifying and mapping the critical factors, challenges, and risks influencing SWS in the port of Abidjan.

Multiple frameworks would be combined with the TOE theory as the main theory to construct the proposed framework. Ven and Verelst (2011) assert that this theory accounts for the broader context of technology adoption. Although previous studies have examined the challenges associated with SWS worldwide, the work is primarily case study-oriented and does not consider technology adoption theory to provide a guiding framework of critical factors. Table 2.5 shows that the TOE framework has been used in previous studies dealing with egovernment assimilation. Still, its application to SWS implementation will provide an initial step toward an understanding of relevant factors, challenges, and risks.

As Sila (2013) argued, the TOE framework is well established and comprehensive as a useful theoretical lens for understanding technology adoption at the government level. It corresponds to the aims of this study, which is to determine critical factors influencing negatively SWS implementation from process stages and stakeholders' perspectives in the port of Abidjan. Pudjianto and Hangjung (2009) point out that the TOE framework is flexible and could be extended to include more factors and categories for exploring drivers and barriers to technology adoption, which means the study could add themes and subthemes according to the findings.

Since there is no unified theory to focus on evaluating the implementation factors of SWS, the TOE theory will be combined with another framework, such as The Single Window System (SWS) Road-map framework.

Although there have been studies exploring SWS worldwide, there is no research explicitly identifying critical factors, challenges and risks negatively influencing SWS implementation from process stages and stakeholders' perspectives in the port of Abidjan. As a result of this gap in the literature, the researcher intends to develop a framework that would incorporate the TOE framework and the Single Window System Road-map Framework. The TOE framework will facilitate the identification and grouping of factors, challenges and risks influencing the implementation of SWS in the port of Abidjan. The Single Window System (SWS) Road-map framework developed by UNECE (2013) is a reference for SWS implementation worldwide. UNECE's major aim is to promote pan-European economic integration. As a result of a survey carried out by the Office of Internal Oversight Services (OIOS) in 2015 to assess UNECE's relevance and effectiveness, as well as the extent to which it is fit for purpose to support Member States in implementing the 2030 agenda for sustainable development, 82% of the

members of the sectoral committees and 88% of the staff rated UNECE as effective in developing standards and technical recommendations (OIOS, 2016).

Furthermore, OIOS (2016) praises UNECE's conventions for their positive impacts on global health and safety, democracy, and cross-border trade. On the other hand, OIOS (2016) also identifies challenges for the organization, some of which pertain to the International Regulatory Co-operation (IRC) activities. A key finding of the survey is that - although many of the UNECE IRC tools have been adopted and have been useful in non-UNECE countries, UNECE still lacks a clear strategy on its global reach beyond its regional role.

Furthermore, OIOS (2016) warns that UNECE risks losing its ability to serve the intergovernmental organizations where IRC tools are shaped due to the absence of an institutional knowledge exchange mechanism.

Applying the UNECE's framework in this study will assist in identifying the different stages and key stakeholders during SWS implementation in the port of Abidjan.

A framework will be developed through a critical review and analysis of previous studies as part of this study. It will provide a new framework based on combining different frameworks, as suggested by Al-Rashidi (2012).

The proposed framework will be divided into implementation factors and the implementation stages.

Conclusion

Contrary to previous studies, this study uses the TOE framework to guide the identification and grouping of factors and sub-factors (challenges and risks) influencing the implementation of SWS. A second unique feature of this study is that, unlike previous studies, it assesses the implementation of the SWS at each stage of the implementation process and for each stakeholder. As shown in Table 2.5, the factors influencing single window implementation in ports are identified, and Table 2.8 describes the identified factors. This chapter is the background theory that reviews existing literature to raise awareness of the SWS concept and its features. The researcher discusses the holistic and motivational factors influencing SWS implementation. The benefits, challenges, and risks of SWS were also summarised and classify within the TOE context.

A Single Window Implementation Framework (SWIF) was also described. It suggests establishing a development cycle centred on ten key components. Thus, implementing SWS in Abidjan's port contributes to developing countries. To implement SWS, the researcher introduced some e-government theories in Chapter two: Diffusions of Innovation (DOI) Theory and TOE Theory. The researcher was able to justify choosing the TOE framework over others due to its flexibility and ability to be combined with other theories. The researcher also considers the Comprehensive Barrier Framework (Lam, 2005) and justified its use in conjunction with TOE theory.

Chapter Three Proposed Framework

3.1 Introduction

In this chapter, the researcher proposes a framework for SWS implementation that can support the implementation process within the context of developing countries in Section 3.4. This chapter explains how the TOE theory is combined with other models, such as the Comprehensive Barrier Framework, Single Window Implementation Framework (SWIF), and SWS road-map framework, to build the proposed framework. The framework proposes two parts: SWS implementation critical factors and the identification of the different implementation stages. To develop the proposed framework, the researcher justified using the TOE theory in section 3.2.1.1 to assist in identifying and classifying the critical factors and sub-factors. In sections 2 & 3, the researcher justified using SWIF (2013) and Lam's (2005) comprehensive barrier to identify critical factors and sub-factors influencing SWS implementation. In section 1, the adoption of the SWS road-map framework was justified in the proposed framework to identify the different implementation stages and key stakeholders at each stage.

Further, section 3.4 highlights the need for testing and validating the proposed framework, which is necessary because there has been limited research on SWS implementation, particularly regarding identifying critical factors at each implementation stage. In implementing the SWS, public and private stakeholders are expected to benefit from the proposed framework shown in figure 3.4. The framework should also allow researchers and decision-makers to analyse and explore the implementation aspects of the SWS.

3.2 Development of the proposed framework

3.2.1 Identification of critical factors through the proposed framework

3.2.1.1 Identification of critical factors through the proposed framework using the TOE theory

In determining the SWS implementation factors, the research considered the TOE theoretical framework as a path to enabling an in-depth understanding of the three main contexts of Information System (IS) adoption. The TOE theory is the preferred theory to be applied, as demonstrated in section 2.4, since it is a useful starting point for understanding the technological, organisational, and environmental factors affecting the adoption process of technological innovations in any organisational context, as suggested by Cahill et al. (1990). Sila (2013) maintains that the TOE framework is a well-established and comprehensive lens for examining government technology adoption. This is in line with the purpose of this study, which is to identify the critical factors that negatively influence SWS implementation in developing countries using the port of Abidjan as a case study. In this research, the TOE theory allows the researcher to consider the broader context in which technology adoption occurs. Therefore, the TOE theory provides a comprehensive guiding framework for identifying and categorising the critical factors affecting SWS implementation. An analysis of the literature review has revealed that previous studies have explored critical factors influencing SWS worldwide without classifying them and distinguishing them between challenges and risks. As a result of this gap, the researcher proposed a framework incorporating the TOE theory developed by Tornatzky and Fleischer (1990). This enabled the research to categorise the SWS implementation factors into technological, organisational and environmental context. Although the TOE framework has been used in previous studies associated with e-government

implementation, as seen in Table 2.11 of section 2.7.3, its application to the SWS implementation domain provided an initial step to understanding the relevant critical factors and sub-factors. As shown in Table 3.1, the three contexts of TOE theory, namely technology, organisation, and environment, are examined about SWS implementation. In contrast, Figure 3.1 illustrates the mapping of nine (9) critical factors during the SWS implementation process in the proposed framework.

The nine (9) critical factors shown in Figure 3.1 were identified through the literature review (Section 2.5). In building the proposed framework, the TOE theory combined with 3 other theories were used.

Table 3-1 Description of the TOE categories in relation to SWS implementation.

TOE Category	Description	Main Construct	References
Technological context	This relates to understanding the technological readiness of stakeholders, if their need in ICT is met and how easy it is to understand and use the SWS.	-Networks and communication reliability ; Standardisation of communication architecture policies and definitions ; Access to ICT ; Compatibility between systems of different organisations ; Maintenance of government and private organisations' websites ; Ease of systems usage ; Well-trained IT staff with integration skills.	Mundy & Musa, 2010; Nkohkwo & Islam, 2013
Organisational context	This relates to understanding the financial cost and organisational culture of the stakeholders during the implementation of SWS.	-Political will ; Leading Agency ; Support from top management and leadership ; Clear and sufficient implementation guidelines ; Change management, human capital development & culture ; Cost of internet access ; Cost of development installation, operation, and maintenance of ICT systems.	(Abeywickrama et al., 2015 ; Joshi 2017). (Mundy & Musa, 2010 ; Alshehri et al., 2012 ; Nkohkwo & Islam, 2013) Gil-Garcia et al., 2008; Al-Rashid, 2012; Almarabeh & AbuAli, 2010
Environmental context	This relates to understanding the competition environment, government regulations and strategy put in place to raise awareness of the potential benefits of SWS	-Collaboration between government and private stakeholders ; Suitable government regulation; Raise awareness of SWS' benefits; The risk of misuse, abuse of information submitted & hacking.	(Joshi, 2017; Agbozo, 2017)

3.2.1.2 Identification of critical factors through the proposed framework using the single window implementation framework (SWIF)

The proposed framework adopts the Single Window Implementation Framework (SWIF), developed by UNECE (2013). It provides an efficient and standardised method to decompose Single Windows into ten components. In other words, it simplifies the tasks required to implement SWS, thus helping overcome the challenges. The SWIF plays a vital role in defining the proposed framework when it comes to identifying the critical factors that influence the implementation of SWS. The ten (10) key components that comprise the SWIF led the researcher to identify five crucial factors influencing the implementation of SWS, as can be seen in Table 3.2. Thus, making it a suitable model for this study.

Table 3-2 Five factors influencing the implementation of SWS identified from the SWIF.

	Factors influencing SWS implementation	Corresponding key activities of SWIF
1	Lead agency role	Stakeholder Requirements Identification and Management
		Single Window Vision Articulation
		Business Process Analysis and Simplification
2	Partnership & collaboration among stakeholders	Stakeholder Collaborative Platform Establishment
3	ICT Infrastructure	Data Harmonization and Documents Simplification
		Technical Architecture Establishment including Standards and Interoperability
		IT Infrastructure and Solutions Execution.
4	Legal Framework	Legal Infrastructure Institution
5	Financial resources	Business and Governance Models Enforcement including Finance,
		Implementation and Operation Governance

The combination of the TOE framework with the SWIF made it possible to identify and better understand the critical factors relating to the implementation of SWS. Together, these two frameworks (TOE & SWIF) contribute to the development of the proposed framework for the implementation of SWS in the context of developing countries.

3.2.1.3 Identification of critical factors through the proposed framework using the Comprehensive Barrier Framework (Lam, 2005).

Lam (2005) used its Comprehensive Barriers Framework to identify and explain the barriers to e-government services, just as the TOE framework has been successful for e-government projects. Lam (2005) categorised the barriers to e-government service delivery into four main groups: Strategy Barriers, Policy Barriers, Organisational Barriers, and Technology Barriers.

According to Lam (2005), the barriers involve the following issues:

Strategic barriers: These include lack of goals and objectives, overambitious objectives, lack of ownership, lack of guidelines and financial Matter.

Technical Barriers – Include poor ICT infrastructure, lack of architecture integration, lack of data standard and lack of Security Model.

Organisational Barriers – such as lack of readiness, the rapid pace of the reform, absence of a champion, management/technical skills, and change challenges.

Policy Barriers – The policy barriers include citizens' privacy, data ownership and egovernment policy evolution.

The four (4) key components that comprise Lam's comprehensive barriers framework led the researcher to identify seven critical factors influencing the implementation of SWS, as can be seen in Table 3.3. Thus, making it a suitable model for this study.

Table 3-3 Seven factors influencing the implementation of SWS identified from Lam's barrier framework.

Lam's (2005) Comprehensive barriers framework		Relevant factors influencing SWS implementation
1	Strategic barriers: These include lack of goals and objectives, overambitious objectives, lack of ownership, lack of guidelines and financial Matter.	Lead agency role
		Financial resources
2	Technical Barriers – Include poor ICT infrastructure, lack of architecture integration, lack of data standard and lack of Security Model.	ICT Infrastructure
		Security and privacy
3	Organisational Barriers – such as lack of readiness, the rapid pace of the reform, absence of a champion, management/technical skills, and change challenges.	Organisational
		Change management
4	Policy Barriers – The policy barriers include citizens' privacy, data ownership and e-Government policy evolution.	Legal framework

Lam's (2005) Comprehensive Barriers Framework is pertinent to the study of information systems, especially barriers to e-government, which could be used as a checklist for project planning or evaluation. Considering the similarities between e-government and the SWS service, as can be seen in Section 2.2, this framework can help identify potential obstacles to the implementation of the SWS. In other words, this study benefits from the Comprehensive Barrier Framework since it helps identify the challenges associated with SWS implementation. Consequently, the researcher adapted this model of e-government to the implementation of SWS in the context of developing countries.

In this study, the researcher combined Lam's (2005) comprehensive framework with the TOE and the SWIF framework to propose a framework which will help identify the critical factors influencing SWS implementation in the context of developing countries using the port of Abidjan as a case study.

3.2.2 Identification of SWS Implementation Sub-factors (Challenges and Risks)

To identify the sub-factors, the researcher used a combination of the TOE framework with other theories such as the UNECE (2013) Single Window System Implementation (SWIF) Framework and Lams' (2005) Comprehensive Barrier Framework. Despite the researcher's investigation of the benefits in Table 2.10 Section 2.8.1 as sub-factors of SWS implementation, they were not included in the proposed framework. The main reason is that in the context of this study, the emphasis is on analysing the adverse effects of critical factors influencing the implementation of SWS in the context of developing countries using the port of Abidjan as a case study. Therefore, the challenges and risks are the most appropriate sub-factors in the proposed framework to achieve the study's main objective. According to Wang (2016), SWS in developing countries enables port authorities and other public and private stakeholders to improve their services' efficiency and transparency and compete internationally.

Unfortunately, developing countries face several challenges in implementing their SWS. In addition to identifying the critical factors, the researcher also identifies the sub-factor through the proposed framework to give a deep insight to decision-makers and researchers on the obstacles that hinder SWS implementation. The sub-factors are link by definition to the critical factors and come to give a deeper understanding of the critical factors identified through the literature review. Scholars have highlighted some of the challenges faced, which could adversely impact SWS implementation. Lam (2005) classified the barriers to e-government development projects, otherwise known as the Comprehensive Barrier Framework, into four – strategic, policy, organisational, and technological. Other researchers such as Kabui et al. (2019) have argued that due to the current poor state of social infrastructure, including the power supply and road network in the developing countries, the practice of SWS is most likely

to be negatively impacted. These challenges include a low level of ICT compliant or literacy; political issues; attitude of the public servants towards change; privacy, and security, as suggested by Abeywickrama et al. (2015).

However, Abdallah & Fan (2012) described the potential risk for Information System (IS) implementation as – Technological/implementation, Social/human, security, financial and legal risks. Other risks are accessibility of information by other agencies, environmental information security such as identity theft; and reducing complete control over information as suggested by Weerakkody et al. (2013).-As seen in Tables 2.11 & Table 2.12, the sub-factors relating to challenges and risks are presented.

3.2.3 Identification of SWS implementation stages and key stakeholders using the SWS road-map.

There is limited literature that identifies different stages and key actors during the implementation of SWS. As a result of this gap in the literature, the researcher developed a framework that incorporates the Single Window System (SWS) Road-map framework developed by the UNECE (2013). The recommended SWS road-map framework considers the evolutionary nature of SWS into five (5) stages, as can be seen in Table 3.4. According to UNECE (2013), it is the world's most widely used road-map for SWS implementation. Based on initial observations, it appears that the implementing company in the port of Abidjan followed the five (5) stages of the SWS road-map framework proposed by UNECE (2013). AlRashidi (2012) states that the five stages of implementation in the SWS road-map facilitate implementation by identifying the different implementation stages and key actors at each stage. Considering this, this study is relevant since the researcher intends to identify the various implementation stages of SWS and key players at each stage for developing countries using the port of Abidjan as a case study. As a result, the SWS road-map framework is suited to this

study. Inspired by this Framework, the author identified five (5) stages and two (2) key actors involved in SWS implementation, namely: Public stakeholders (Government agencies) and private stakeholders (Private companies).

Table 3-4 Evolutionary development model of Single Window

Stages	A Single Window Road-map in five evolutionary stages (UNECE 2011)
Stage 1	Paperless Customs
	E-payment for Customs Duty
	Container Loading List
	Simple e-documents Exchange with Port Authority and/or Terminal Operators
Stage 2	Connecting Other Government Back-end IT systems,
	E-permit Exchange with Paperless Customs System
Stage 3	E-documents Exchange stakeholders within the (air, sea, dry) port community
Stage 4	An integrated national logistics platform with also traders and logistics-service providers information exchange
Stage 5	A regional information-exchange system

3.3 Proposed Framework

There is an apparent need to develop a framework necessary to identify critical factors influencing SWS implementation as a result of the gaps highlighted in the previous sections and discussions in Chapter two. The literature review revealed that there is no theoretical framework on information systems (IS) analysing the SWS implementation process in developing countries. According to Ndou (2004), most existing frameworks have dealt with

information systems in general. Furthermore, not many research studies have focused on the critical factors and the sub-factors (challenges and risks) influencing SWS implementation, as opined by Ndou (2014). Finally, a review of the extant literature revealed that existing studies generalise SWS implementation critical factors instead of categorising them into technological, organisational, and environmental factors (TOE theory).

Thus, having reviewed the relevant literature, the research proposed a framework incorporating technological, environmental, and organisational factors into the following categories: challenges and risks.

The proposed framework is based on the normative nature of the TOE framework, which allows the researcher to consider the broader context in which the adoption takes place, as suggested by Hoti (2015). Since there is no unified theory to focus on SWS implementation, the researcher combined the TOE theory with other research models such as the Comprehensive Barrier Framework, the Single Window Implementation Framework (SWIF) and the SWS road-map framework.

The research intends to validate the proposed framework by conducting an investigative case study through semi-structured interviews with various public and private stakeholders of the Ivorian SWS, such as the port authorities (PAA), government body aligned to tax collection on goods coming into and leaving Cote D'Ivoire (Org 3), implementing company (Org 8), government body aligned to trade (Org 6), government agencies issuing permits, shipping companies and other key stakeholders using the SWS for import and export purposes.

The research expects that the factors identified from the literature could be specify and that new factors could be identified through the interviews, which would form part of the revised framework – where necessary.

According to Joshi (2017) the SWS and e-government appear to be similar concepts apart from SWS referring to the dematerialisation of import and export procedures via the maritime port, whilst e-government relates mainly to the application of ICT to deliver government services, exchange information, communicate transactions, integrate various stand-alone systems between government to citizen (G2C), government-to-business (G2B) and government-to-government (G2G).

It is, therefore, strongly expected that there would be little or no difference between the factors influencing both SWS implementation and e-government implementation in an ICT environment, bearing in mind that systems vary from country to country. This would help managers and academicians get a holistic view of the critical factors to effectively plan for their organisations' SWS implementation process.

The proposed framework shown in Figure 3.1 identifies critical factors influencing SWS implementation throughout the five evolutionary development stages, enabling decisionmakers, academicians, and researchers to prioritise in order of relevance for successful implementation of SWS at every implementation stage. Furthermore, the proposed framework would help researchers understand and explain why developing countries in general and Côte D'Ivoire in the port of Abidjan is struggling to implement entirely paperless SWS as suggested by the UNECE (2013) SWS road-map framework.

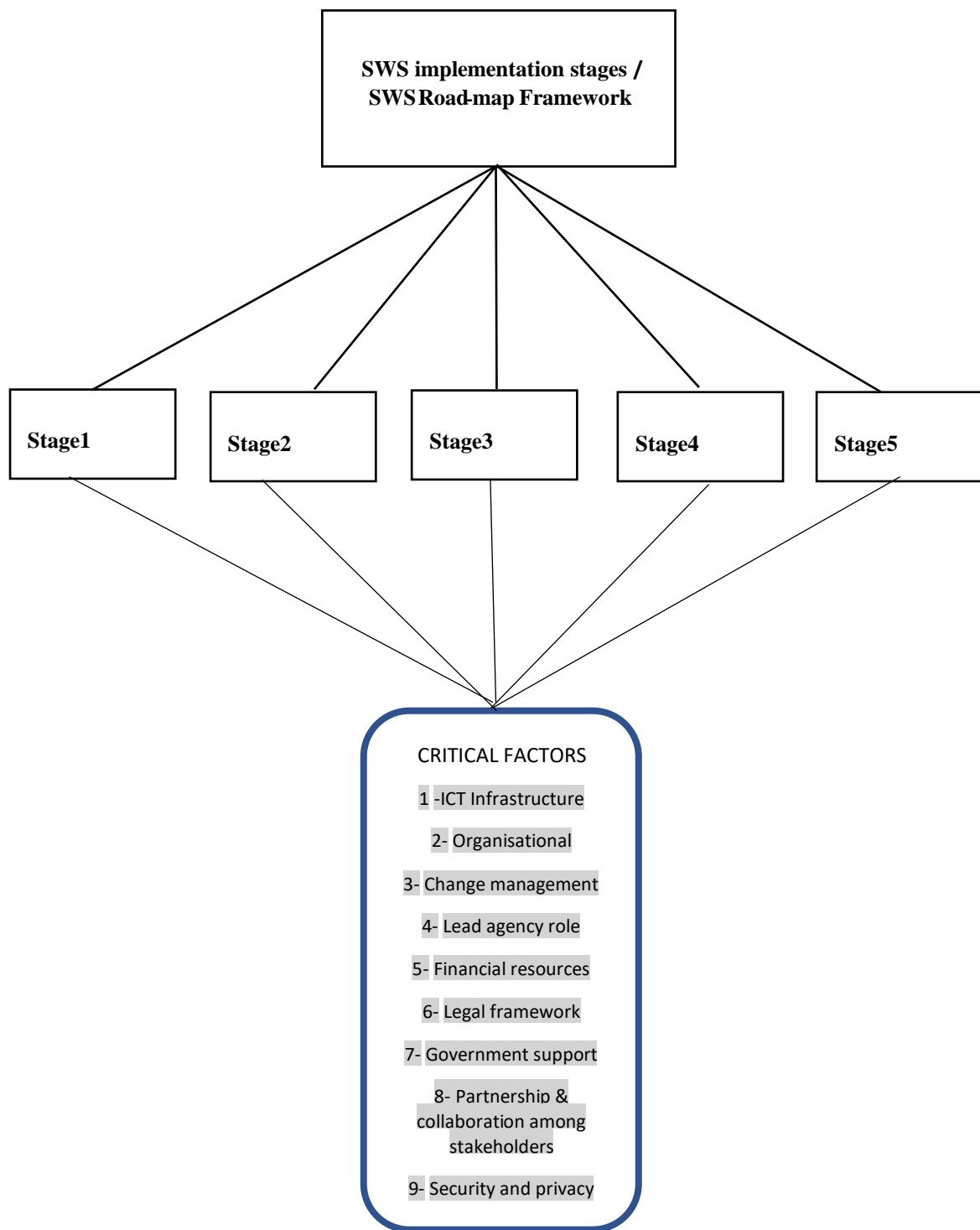


Figure 3-1 Proposed Framework: SWS Implementation Framework

3.4 Strategy for validating proposed Framework

The proposed framework Figure 3.1 has integrated four different models that represent a comprehensive framework for SWS implementation in Côte D'Ivoire and possibly in any developing country. Government has a crucial role in ensuring the successful implementation of SWS, being the major actor, especially in areas of international trade, Import/Export, people, process, cost, and technology. Hence, the next stage of this research would be to assess the conceptual boundaries of the proposed framework in a real case study focusing on public and private stakeholders, as will be discussed in chapters five and six. Through the proposed framework, the research highlights the critical factors that influence the implementation of SWS in developing countries and links them to the different implementation stages. The two parts that form the proposed framework are:

SWS implementation factors – Identifying the Technological, Organisational and Environmental critical factors with possible new factors within the TOE context (Tornatzky and Fleischer 1990) (Comprehensive Barrier Framework - Lam, 2005) (Single Window Implementation Framework –UNECE, 2013)

Identifying the different implementation stage of the SWS (Single Window System Roadmap framework –UNECE, 2013)

The researcher will attempt to validate the proposed framework and identify additional factors through interviews and thematic analysis of the respondents' answers.

Conclusion

This chapter has analysed the proposed framework through a series of critical factors that are technological, organisational and environmental. The proposed framework falls under a strategy that highlights the prominent role of government in the SWS implementation process. As a result, linking the critical factors influencing SWS implementation to sub-factors corresponding to challenges and risks is relevant. The integration of the SWS Road-map framework (UNECE 2013) to the proposed framework, allow the identification of the public and private stakeholders involved in the implementation process. Ultimately, the proposed framework is motivated by identifying gaps that affect the implementation of SWS in the context of developing countries, with the port of Abidjan as a case study. Furthermore, the proposed framework provides an overall vision of the hierarchy of mechanisms and project actors that would lead to a full paperless SWS implementation in the context of developing countries.

Chapter Four Research Methodology

4.1 Introduction

This chapter discusses an overview of the research philosophy, research choices and approaches, the strategy used and describes the methods (data collection and data analysis) employed during the study. Validity and reliability through triangulation, and ethical considerations are also presented. The research aims to identify and evaluate the significance of critical factors influencing the implementation of SWS in a developing country context, using the port of Abidjan (Côte d'Ivoire) as a case study. The methods of addressing the research questions and research strategies are explained. The instrumental case study as a qualitative research method is discussed with its characteristics, strengths, and weakness.

Lastly, the researcher explains how theoretical saturation was achieved.

In selecting an appropriate research methodology, design, and strategy, several factors should be considered, such as the topic, objectives, research questions, and nature of the research problem. These factors, along with the researcher's experience, skills, resources, time frame to conduct research, and access rights significantly influence the research design and strategy choices made in this research (Yin, 2009).

4.2 Philosophical Stance

The research philosophy is defined within the extant literature as the system of beliefs and assumptions that seeks to understand the nature of reality (ontology), the appropriate ways of enquiring into the nature of the world (epistemology) and the relevant data collection methods used to enquire into a specific situation (methodology) (Eriksson and Kovalainen, 2015).

The social constructivist or interpretivist philosophy was adopted to examine the phenomenon of SWS implementation within the port of Abidjan. The epistemology of the social constructivism/interpretivism advocates a relativist ontology, which opines that although reality exists, it is construed as subjective since it relies on the perspective of the observer (Eriksson and Kovalainen, 2015; Easterby-Smith et al., 2020). Based on the relativist ontology of social constructivism, the research assumes that the nature of implementation of the SWS in Abidjan port will not rely solely on a single reality. This is because the reality of SWS usefulness will vary depending on how the various stakeholders - both within the port and associated with the port, utilise the system to achieve their strategic goals.

This view of relativist ontology is further strengthened in that the social constructivist view also leans towards a subjective opinion of reality and holds that there is no single view of reality because reality is socially constructed. As such there can be many enriching perspectives describing the reality of an object. Thus, adopting a social constructivist stance can be helpful to provide insights into the actions that both guide and underpin SWS implementation within the Abidjan port.

On this basis, the research contends that there is a fit between the philosophical stance adopted and the selected research design, which is outlined in the subsequent sub-sections. By drawing on social constructivist epistemology, the research adopted an instrumental qualitative case study methodology (Stake, 2006; Hyett et al., 2014). The justification for adopting the instrumental case study design was based on its capability to bring the phenomenon of interest - SWS and its implementation within the Abidjan Port, to the fore. The research drew on the focal stakeholders connected to the implementation of the SWS within the Abidjan port. By utilising the lens of social constructivism, the instrumental case study method contributed to

theory building on a relatively new phenomenon in the early stages of its implementation within ports in Africa (Stake, 1995; 2006; Gehman et al., 2018).

4.3 An instrumental case study as the research method

In congruence with the philosophical stance and the research objectives, the research utilised Stake's instrumental case study design (Stake, 2005; 2006; Mills, Durepos and Wiebe, 2010). The purpose of using an instrumental case study was to aid in the examination of a case to provide insight into an issue or refine a theory (Stake, 1995; 2006; Boblin et al., 2013). Different from the intrinsic case study where the case itself is of primary or central focus, an instrumental case study primarily focuses on an issue or phenomenon as it may be peculiar to other cases, and rather shifts the case itself (context) into its secondary focus (Stake, 2005; 2006). For this research, the phenomenon of interest was the SWS and its implementation within the Abidjan Port.

The instrumental case study adopted by this research was useful for unpacking the mechanics underpinning the implementation of SWS within the Abidjan Port from both a policy and practitioner perspectives. As a type of case study methodology, it is suitable to explain "how" SWS is implemented within the Abidjan Port, highlighting the critical factors influencing its implementation and "why" it is taking so long for the authorities to implement a full paperless system (Piekkari and Welch, 2018; Eriksson and Kovalainen, 2015; Gehman et al., 2018).

4.4 The strength and weaknesses of the method

The choice of using an instrumental case study design was predicated on a careful consideration of the advantages and disadvantages that an instrumental case study presented to the research.

A significant advantage for considering the instrumental case study design is that it enabled the research to focus on exploring the critical relationships underpinning SWS implementation rather than being solely fixated on the context of all other phenomenon within Abidjan port as a case, while not relegating it entirely to the background. Rather, it enabled the research to focus on the implementation of SWS, the mechanics underpinning its evolution, as well as highlight the critical factors necessary for its implementation and continuity as the foreground of the case study. Another significant advantage was the flexibility of this case study methodology, which enabled the research to adapt to the emergent insights during the operationalisation of the research (Stake, 2006; Boblin et al., 2013), since previous theoretical and empirical insights is scant. Nonetheless, a limitation to the methodology's flexibility is its lack of a structured outline for implementing data collection in a case study unlike other case study methods proposed by Kathleen Eisenhardt or Robert Yin (Stake, 2006). This required that I as the researcher leverage on my intuition as well as draw on extant research studies that have utilised Stake's instrumental case study design. This is not without precedence (*see* Fearon, Hughes and Brearley, 2021).

Another advantage for using this case study method pertains to its use of multiple sources of data (Stake, 2006; Boblin et al., 2013), which have the propensity to improve the data and methodological triangulation of the research (Denzin, 1978; Patton, 1999; Stake, 2005).

4.5 Case study protocol

The instrumental case study method also articulates various protocols for designing and implementing a case study (Stake, 1995; 2006). The first protocol outlines the selection of the case, its definition and the boundaries of the case setting (Stake, 2005). This was implemented in this research by outlining the setting, location, respondents, and the kind of events to be investigated.

The research setting was a purposefully selected port of Abidjan (Côte D'Ivoire) known as Abidjan port. The rationale for selecting the Abidjan port is because it handles 80% of the country's maritime traffic and is the third largest port on the West African coast, behind Dakar and Lagos, with a throughput of around 650,000 twenty-foot equivalent units (TEUs) (PAA, 2021). The Abidjan port is an information rich setting from which an examination of how the implementation of SWS unfolds can be studied. The location of the research setting Abidjan, the economic capital of Côte D'Ivoire.

The research participants for the case study comprised of three categories of respondents. The first category of respondents interviewed were managerial level employees from different organisations. The second category of respondents interviewed were operational level employees from different organisation. The third category of respondent interviewed was an independent expert in SWS who served as consultants to the implementation of SWS in the Abidjan port. The sampling strategy, inclusion and exclusion criteria are explained in the subsections below.

With regard to events, the research focussed on two kinds of events. The first event involved the use of archival data such as internal files, videos of workshops, published reports and articles to frame an understanding of the evolution of SWS implementation from inception till

date. The second event involved the use of the semi-structured interview protocol to tap into the insights and knowledge of information-rich respondents on SWS implementation at the port of Abidjan.

The second protocol demands an articulation of the different sources of data for the research. The research utilised both primary and secondary data sources as these are useful in developing an instrumental case study, which is also inductive. The rationale for using multiple data sources was to facilitate the triangulation of data by identifying points of convergence or divergence from the emergent findings (Stake, 1995; 2005; 2006). The secondary data source also enabled a retrospective perspective of SWS adoption complementing the multiple realities or subjective views of SWS implementation through primary data sources of semi-structured interviews.

The third protocol articulates the analysis of data emerging from the case study from both primary and secondary data sources. The data collected were analysed using documentary and thematic analysis respectively.

Before embarking on the second protocol, the research carried out a pilot study based on the decisions made in the first protocol (see 4.7.1.4).

4.6 Research design

During this study, an appropriate research design was used to collect data to address the study's methodological issues. Research design has been endorsed by scholars as a realistic process for ensuring validity and reliability of research results and for ensuring the method is objective and the information derived is pertinent to the research problem (Anderson, 2017). To Alhujran (2009), the research design is about making a problem researchable by organising the study to lead to specific results related to a particular question. Therefore, the research design concerns

setting up a study to produce answers to specific questions that allow for research to be undertaken on the problem at hand.

The literature identifies several interpretations of research design, but this study focused on Alhujran's (2009) conception of research design as a strategy (or basic plan) that allows for drawing broad conclusions.

Therefore, the current research problem focuses on the critical factors influencing negatively SWS implementation in the context of developing countries, using the port of Abidjan as a case study. The research aims to evaluate the criticality of critical factors in the implementation process of SWS within the context of developing countries. To achieve this, a framework for decision-makers and implementers of change in the port of Abidjan was proposed. Additionally, the proposed framework can be used as a guide for academicians and researchers implementing SWS in other developing countries.

As seen in Figure 6.2, the first stage of this study was to identify the critical factors that influence SWS implementation worldwide from the relevant literature. The second stage involved both a critical review of existing theories relating to SWS implementation and the development of a proposed framework for SWS implementation is developed. In fact, through thematic analysis, existing theories relating to SWS implementation were reviewed and analysed, leading to the identification of the TOE theory as the most suitable theory to be used as a guiding framework to conduct this study. The TOE was combined with other theories such as The Single Window Implementation Framework (SWIF) UNECE (2013), the Single Window System Road-map UNECE (2013) and the Comprehensive Barrier Framework from Lam (2005).

After reviewing the literature and identifying research gaps, the researcher decided to focus on the research aim, as shown in section 1.3. In this research, the researcher selected the interpretive approach because it allows the adoption of a variety of methods, as explained in section 4.2. The researcher, therefore, adopted qualitative analysis to support the development of deep understanding, theory building, and the description of everyday experiences. As such, the qualitative analysis would be crucial in developing a framework for SWS implementation in developing countries' context. The researcher identified and developed appropriate methodological strategies and collected data through interviews with private and public stakeholders.

The third stage, as seen in Figure 4.1, involved the analysis and the interpretation of qualitative data. It was possible to collect and collate data by identifying appropriate analytical units and developing analysis procedures. Data were successfully collected and collated by identifying and developing suitable units of analysis. These processes involved conducting interviews and triangulating information from multiple sources. The data were analysed and interpreted by comparing primary and secondary research data and validating the developed conceptual framework.

Finally, at the last stage, the researcher refined the proposed framework for SWS implementation, highlighting contribution to the theory and practice of SWS implementation and the body of knowledge in new technology adoption. Also, at this stage, some recommendations were made to assist the Ivorian government agencies and private stakeholders in prioritising their actions to minimise the impact of critical factors in the implementation process of SWS in the port of Abidjan.

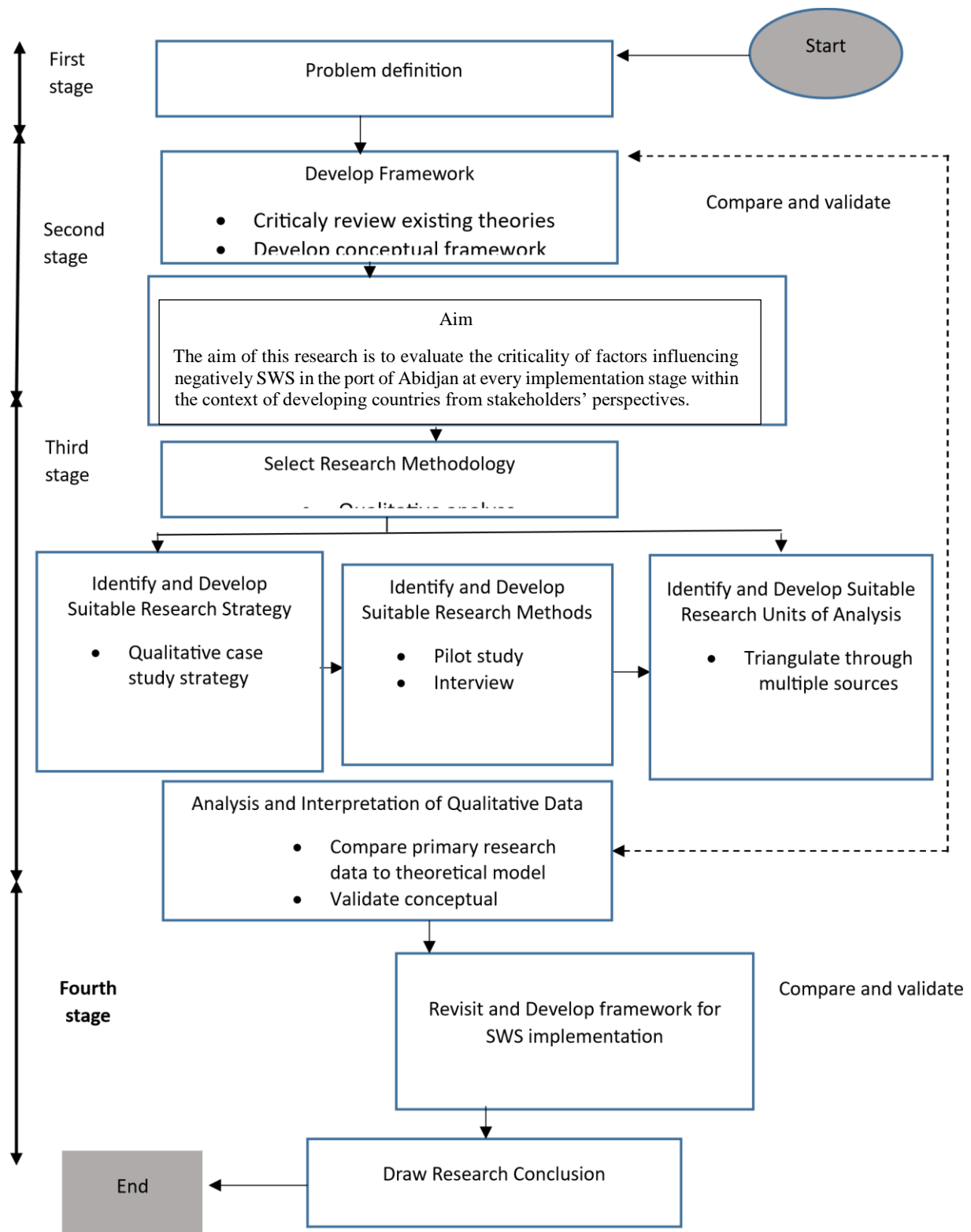


Figure 4-1 Research design for SWS implementation in the context of developing countries

4.7 Data collection and data sources

In this research, a combination of real-time and retrospective data collection approaches was utilised to capture the dynamic process of SWS implementation in ports (Pettigrew,1990). The data collection started in April 2021 after obtaining ethical approval in 16/03/2021. Due to the Covid 19 pandemic related restriction, I could not travel to Côte d'Ivoire to conduct interviews in person. Therefore, the data was mainly conducted online spanning the period of April to May 2021.

The port of Abidjan's SWS implementation, a relatively new phenomenon, requires detailed, rich, and evocative data. Therefore, multiple sources of data were utilized in this study. The focus was to extract insights from qualitative data including interviews and internal archives. Interviews with key informants are an efficient means to obtain rich and empirical data that capture both real-time and retrospective processes of interest (Eisenhardt and Graebner, 2007). Moreover, internal archives give insights related to the environmental contexts in which an event or strategic decision occurred. This section focuses on describing the different data source and their use in the analysis as can be seen in Table 4.1. A more detailed description of data sources presented in the following subsections.

Table 4-1 The detailed description of data sources and their use in analysis

Data Sources	Details of the data	Use in the analysis
Semi-structured Interviews	<p>Fourteen (14) semi-structured interviews with thirteen (13)</p> <p>Operational level and managerial level employees involve in SWS implementation in their various organisations have been interviewed. One (1) independent expert in SWS was also interviewed.</p>	<p>-Gained insights on operational/managerial level employees' interpretation on what are the factors and how do they influence SWS implementation in developing countries context.</p> <p>-Presented the preliminary findings for the sake of triangulation and deepening understanding on validity of the researcher interpretation.</p>
Internal archives	<p>125 files of Internal documents including company annual reports, presentations, product and marketing guidelines, and strategic planning published online in</p> <p>industry news website such as: -</p> <p>https://guce.gouv.ci/?lang=en https://www.portabidjan.ci/ and online blogs.</p> <p>13 video recordings of senior managers' internal presentations and discussions on SWS strategy ranging from 4 -90 minutes of recording.</p>	<p>Provided a detailed description of the Ivorian SWS platform strategy including the platform technical design and partnership strategy and how it evolved over time (Appendix 12)</p> <p>Gained understanding on the various stakeholders connected and using the SWS platform (Appendix 6)</p> <p>Provided an understanding on the level of implementation of the SWS per implementation stage (Table 4.8).</p>

4.7.1 Data collection using semi-structure interviews

The sections below examine the data collection phase using semi-structure interviews, which represents an important phase of a study according to Bryman & Bell (2015). As major decision milestones for this study, this section introduces the targeted group, the primary population, and the sampling methods.

4.7.1.1 Sampling strategy and sampling size

This research focuses on SWS implementation in the port of Abidjan as qualitative research. In a port, a diversity of actors act and interact in an environment marked by a variety of IT

systems for collecting, processing, and analyzing data (Kapkaeva et al., 2021). The SWS enables all actors of the port to be federated around a common data exchange system (Tessmann and Elbert, 2022). The sample to conduct this study was taken from a population of stakeholders operating at the port of Abidjan, which is shown in

Table 4-2 Port Community System and involved stakeholders

Public stakeholders	Private stakeholders
Ministry of trade	Shipping Agent
Maritime authorities	Clearing & Forwarding Agents
Veteneray and phytosanitary control services	Importers & Exporters
Ministry of Agriculture	The implementing company
Customs	Stevedore company
Port authority	Insurance Company
Border control	Commercial bank
Harbour Master's office	Truckers
Dangerous cargo management	Quantity and quality controller
	Towing / Tugging
	Warehouse

Source: (PAA, 2021)

To conduct this study, the researcher selected only those stakeholders that are already interacting with the SWS platform. For the purpose of this research, the list of fourteen (14) stakeholders was obtained in this manner (Appendix 6). Consequently, 14 interviewees from

13 different organizations along with one (1) independent expert in SWS participated in semistructured interviews (Appendix 6). The study revealed that each organization involved in the research had a designated person who is responsible for implementing the SWS, since it is a relatively new project. The research targeted the IT director or senior operational staff member as they were considered to possess relevant strategic and operational knowledge on the SWS implementation process (Yin, 2012; Creswell, 2013). These respondents were considered as information rich and knowledgeable respondents who are able to provide a detailed account of their actions with the requisite justification; and this is not without precedent (see Gehman et al., 2018). Thus, individuals who are responsible for implementing the project will be able to provide details on the progress made, the challenges, and the next steps. This explains why one individual was selected for each organization based on the criteria set out in the initial email to the organisations (Appendix 1).

A purposive sampling strategy was used to select fourteen (14) information rich respondents for semi-structured interviews (Eisenhardt, 1989; Zhang & Wildemuth, 2017). The final use of 14 respondents was based on theoretical saturation achieved from the insights gleaned from interviewing respondents on the issue of SWS implementation (see Section 4.10.2). This was further justified by Creswell (2002) guidance, which asserts that a good qualitative study should have a sample size of between 12-20 respondents. Morseo, the SWS implementation project is a niche project that is still under implementation, and so has very few implementation partners directly engaged with its roll-out.

4.7.1.2 Recruitment of interviewees

Consent was gained from the various participants by sending emails or invitation letter to the HR (Human Resources) of their various different departments or companies, introducing the

researcher and explaining the purpose of the research (Appendix 1). Also, the criteria of the participants wanted for the interview were given. Due to the nature of the research (online interview), formal written consent was expected from the organisation/department by email. Following this consent, the post, and the name of the suitable participants from the various organisation/department was received by email. In fact, the various Organisation/Departments sent out lists of people to be interviewed as the most appropriate ones to answer the questions. Following on from this, an email was sent to the individuals asking for their participation, which included information to gain their consent and information on the research (Appendix 3 & 4). They were also notified that participation is voluntary and responses would be confidential. This email included a link for an online form where participants can sign in and provide consent (Appendix 2). Once the participants sign the consent form on the link, it would be sent directly to the researcher. Appendix 6 gives the list of organisations/companies that were approached for the interviews.

The following paragraphs describe the inclusion and exclusion criteria for SWS experts.

Inclusion Criteria:

The inclusion criteria was classified into two strands. The first strand involved the selection of the relevant stakeholder organisations. This criterion sought to capture government agencies responsible for issuing permits for import and export purposes. It also sought to capture, private companies such as implementing companies and other private stakeholders using the SWS for trade purposes (e.g. shipping companies).

The second strand was concerned with selecting respondents involved with the strategic and operational implementation of the SWS. This includes both operational and managerial level employees based on their job affiliation and role in the SWS implementation process within

their organisations. For instance since the SWS is mainly an IT system, the selected respondents included, in some cases, are information technology (IT) experts in charge of IT systems in their various organisations. A profile of respondents is provided in Appendix 9.

Exclusion Criteria:

The sample excluded professionals whose tasks do not require the use or sufficient use of the SWS within their respective companies.

4.7.1.3 Ethical Consideration

According to the University of Portsmouth policies, the researcher considered all relevant ethical principles for research involving human subjects, as suggested by Kolstoe (2020). The email was used as the first contact method with potential participants to provide them with all the information they needed. It included an invitation letter, a participant information sheet, a consent form, and a preview of the interview topics with some guiding questions. The interviewees were contacted again via email or phone within five working days of sending out the emails with the information sheets and invitations. The call was mainly focused on maintaining the confidentiality of the interview data. Once the contacted individuals agreed to participate, a time and date for the interview were arranged.

4.7.1.4 Pilot studies

A pilot study is a small-scale preliminary study conducted before the main research to check the feasibility or improve the design of the research. Pilot studies help avoid wasting time and money on an inadequately designed project. The empirical research started by conducting a pilot study involving two knowledgeable professionals of the Ivorian SWS. One of them is a senior IT expert for a Government body aligned to tax collection on goods coming into and

leaving Côte D'Ivoire (Org 3) and the other one is a senior IT expert for the implementing company. A key learning from the pilot study is that the questions had unclear structures and repeated content. As a result of the pilot study, the interview questions were revised to eliminate redundant questions. Furthermore, an important outcome of the pilot study was the development of an interview guide. A professional translator reviewed the French translations of the interview questions. The following section discusses the interview guide and its use during interviews.

4.7.1.5 Interview protocol

Semi-structured interviews were conducted to gather primary data from key SWS experts. According to Bryman and Bell (2015), a semi-structured interview is where the researcher follows a topic list, also known as an interview guide, with partly formulated questions. The flexibility of this type of interview makes data collection extremely effective. All interviews were done in French since it is the primary language spoken for all business transactions to import and export goods from the port of Abidjan. After the interviews, the transcription was done in French, followed by translating the transcripts into English. Finally, the coding and the analysis were done in English (See Appendix 7).

The interviews with SWS experts took place from May 2020 to August 2020 (see Appendix 5 for interview protocol). During the interview, the author provided the SWS implementation road-map adopted by UNECE (2013) as a communication support document (Figure 2.2). This road-map has been used to give participants a clear idea of the different stages of SWS implementation as adopted by UNECE (2013). Although the interviews were planned to last 40 minutes, they lasted 60 minutes and an hour and half in some rare cases. The average duration is about 50 minutes in all interviews. Appendix 9 presents an overview of the experts'

background, years of experience, and current positions. All experts met the inclusion criteria. Among the SWS experts, the professional roles ranged widely from Senior manager to operation

4.7.2 Data collection using document review

The following sections examine the document review phase of data collection. In this section, the type of document used and the data collected are described.

4.7.2.1 Stakeholder Archives

Stakeholders' documents are also a significant source of data for this study. Documents were found online in the repositories of private and public stakeholders, provided by interviewees or searched for when indicated. The access to stakeholders' archives allowed me to collect 125 documents related to the SWS initiatives from 2013 to 2021. The collected documents included annual report, strategic planning, strategy presentations to external audiences, product and marketing guidelines and newsletters in various formats (Pdf, PowerPoint, and Word).

The documents selected were those foundational for SWS implementation in the port of Abidjan. These document included terms and conditions of use of the SWS platform, decrees and laws regulating import export, digitalisation and the ICT sector in Côte D'Ivoire as can be seen in Table 4.3.

Table 4-3 Documents analysed

	Document analysed	Purpose	Source
1	DECREE N ° 127 / MCAPPME / MPMB of March 21, 2014	This decree determines the conditions for entry into Côte d'Ivoire of foreign goods of any origin and any provenance as well as the conditions for the export and re-export of goods to foreign destinations.	Ministry of Trade https://www.douanes.ci/ (Accessed : 17 March 2021)
2	Law No. 2013-877 of December 23, 2013 ratifying Ordinance No. 2013-662 of September 20, 2013	This decree relates to competition, with regard to the conditions of entry into Côte d'Ivoire of foreign goods of any origin and from any provenance, as well as the conditions for the export and re-export of goods to the foreign.	Customs (Org 3) https://www.douanes.ci/ (Accessed : 17 March 2021)
3	Decree n°93-313 of March 11, 1993 for the enforcement of law n°91-999 of 27 December 1991	This decree relates to competition, with regard to the conditions of entry into Côte d'Ivoire of foreign goods of any origin and from any provenance, as well as the conditions for the export and re-export of goods to the foreign.	Ministry of Trade https://www.douanes.ci/ (Accessed : 17 March 2021) https://www.portabidjan.ci/ (Accessed : 22 January 2021)
4	Terms and conditions of use of the SWS platform 13/09/2022.	It relates to the conditions of use of the SWS platform and the responsibilities of all stakeholders.	GUCE-CI https://guce.gouv.ci (Accessed : 15 February 2021)
5	Law No. 2012-293 of March 21, 2012	It relates to Telecommunications, Information and Communication Technologies, to govern the telecommunications sector.	Ministry of Telecommunication / GUCE-CI https://www.linkedin.com/posts/guce-ci_nous-poursuivons-cettesemaine-toujours-avec-activity-6892833621795835904-kmIk (Accessed : 10 January 2022)
6	Law No. 2013-867 of December 23 2013	It relates to access to information of public interest.	Ministry of Telecommunication / GUCE-CI https://www.linkedin.com/posts/guce-ci_guceci-tradeportalprocess-activity-6895337492556455936-ppjE (Accessed : 10 January 2022)
7	Law No.2013-451 of June 2013	It relates to the fight against cybercrime.	Ministry of Telecommunication / GUCE-CI https://guce.gouv.ci (Accessed : 15 February 2021)
8	Law No.2017-803 of December 7 2017	It relates to the orientation of the information society.	Ministry of Telecommunication https://www.linkedin.com/posts/guce-ci_guceci-tradeportalprocess-activity-6894288539752775680-Rzpm (Accessed : 10 January 2022)

The analysis of the documents above identified information about the policies, guidelines for service delivery procedures and the responsibility of stakeholders using the SWS platform. Since the implementing company interacts with all stakeholders on a daily basis, its internal documents were mostly used to obtain relevant information.

As part of the implementing company's documentation, governance, service delivery, and stakeholders' satisfaction evaluations reports are also included.

The implementing company's documents made it possible to obtain the status of the Ivorian SWS in the port of Abidjan (Table 4.3). It enabled the inventory of the strategic changes and the understanding of how the platform strategy unfolds over time. In utilising the implementing company's documents much further, a detailed account of the SWS platform's technical features (Appendix 12), business models (section 4.5.4) , and positioning strategy in general emerged. The implementing company's document helped to identify all stakeholders actively connected to the SWS (Appendix 6), which was fundamental in the sampling process of identifying respondents. The stakeholders' documents collected from the years 2013 to 2021, provided an overview of the stakeholders' overall strategic objectives and vision toward the SWS agenda. For example, the implementing company's annual reports revealed some delays in the implementation process of the SWS, which was confirm during the semi-structure interviews by stakeholders (see Section 6.2). In addition, the implementing company's documents revealed the fact that both public and private stakeholders benefited from free training, on top of which public stakeholders received assistance from the government to acquire ICT infrastructure. All these findings were confirmed during the semi-structured interviews. Finally, 13 video recordings of workshops and presentations by senior managers from the implementing company concerning the SWS platform initiatives were accessed. An average length of each video is 5 minutes. The videos were used to complement the insights

from the documents and interviews. Overall, the videos enabled a complementary understanding of the SWS process, not only at the firm-level of how various stakeholders interact within the SWS process but also an institutional-level view of its operation at the Abidjan port. These reports were not meant to provide an in-depth understanding regarding the strategic actions of other actors in the value chain of the SWS implementation, since this research only interested in the views and interpretation of key stakeholders about how the implementation of SWS has evolved SWS. Hence, the reports and videos were utilized mainly to complement and triangulate views of key stakeholders on the implementation of the SWS.

In addition, stakeholder documents related to SWS implementation were collected. These data provided an outsider view of SWS implementation. As there was no published literature on SWS implementation in the port of Abidjan, the stakeholders' documents provided an overview of the Ivorian authorities plan for SWS, as well as what has been achieved through the various SWS initiatives.

In general, the data from stakeholder documents and the videos provided an understanding regarding the context of SWS and the progression of its implementation. These were helpful for developing a case history of SWS implementation at the port of Abidjan.

The documents were organised and categorised according to their year of publications, that is from 2013 to 2021. Thematic analysis was used to make a meaning from the data collected by identifying codes and themes from the data as can be seen in Table 4.5.

4.8 Data analysis

The analysis of the data was conducted in two parts. The first part focused on a document analysis, which was used to construct a case history of SWS implementation within the port of Abidjan. The second part involved a thematic analysis of interview and video transcripts. These were used to generate the critical factors across the different implementation stages of the SWS.

4.8.1 Data Analysis from document review

Qualitative research advocates for the contemporaneous collection and analysis of research data (Eisenhardt, 1989; Yin, 2003; Eisenhardt, 2021). This research utilised document analysis in addition to thematic analysis as a means of triangulation (see subsection on triangulation) (MacKieson, Shlonsky and Connolly, 2018; Bowen, 2009; Denzin, 1970). In analysing stakeholders' archives, the document analysis technique was utilized.

In practice, document analysis has often been used in combination with other research methods as a means of triangulation, to supplement and corroborate findings across different data sets in order to reduce potential biases in a study (MacKieson, Shlonsky and Connolly, 2018; Bowen, 2009; Denzin, 1970). In its essence, a document analysis refers to any systematic procedure for reviewing or evaluating documents; for 'finding, selecting, appraising (making sense of), and synthesising data contained in documents – both printed and electronic' (Bowen, 2009: 28).

In this study, data were grouped based on the sources and the year it represents. As mentioned earlier, the document analysis was performed in an iterative and nonlinear fashion. Nevertheless, for the sake of clarity, the document analysis can be described in two sequential steps:

First step: Constructing a case history focus on the evolvement of SWS and its features since its launch in the port of Abidjan in 2013.

Second step: Investigating the different regulations, challenges and stakeholders involve in SWS implementation in the port of Abidjan.

Step 1: Constructing a case history. As suggested by Yin (2009), the first data analysis was aimed to build a chronological description of the different chronological evolutions that the SWS has known in the port of Abidjan. The analysis of stakeholders' documents covered an eight-year period between 2013, when the SWS project was adopted, until May 2021. In constructing a case history, stakeholders' documents were utilised over the years. These data sources contained valuable information related to the launch of the Ivorian SWS and its features as can be seen in Figure 4.2, Table 4.4 and Appendix 12.

Step 2: Investigating the different regulations, challenges and stakeholders involve in SWS implementation in the port of Abidjan.

At this stage, the focus was first of all on the different regulations, stakeholders involve in SWS implementation and the challenges faced for its successful implementation.

The content of stakeholders' documents were examined (e.g. Presentations, videos, Product & Marketing guidelines, reports) describing the platform road-map, target stakeholders and benefits. Through the content of stakeholders' documents, the list of all the stakeholders that the implementing company managed to interconnect to the SWS platform was discovered (Appendix 6). The PowerPoint presentations also revealed some difficulties encountered during the implementation of the SWS at the port of Abidjan. Furthermore, with data from stakeholders' archives, it was possible to document the usage of the SWS platform and egovernment policy in Côte D'Ivoire (Table 4.4).

An examination of stakeholders' documents revealed the reasons for the Ivorian government and port authorities adopting the SWS, its challenges, and benefits. For example, documents from PAA (Org 2) confirm the following:

“For the authorities of the PAA, digitization is a necessity to be a competitive port. To this end, a seminar bringing together all the actors of the port community was organized in Grand Bassam (Côte D'Ivoire) to analyse the challenges to the competitiveness of the autonomous port of Abidjan. The results of the seminar revealed a dysfunction between the IT system of the SWS platform and the customs SWS, which work in parallel. The SWS cannot operate properly because of this malfunction. As well as this, a solution must be found to the incompatibility between the PAA and SWS computer systems.” (PAA, 2021)

In the last stage of data analysis, the emerging theoretical constructs were verified by running through the data once again. In this stage of the study, data analysis was used not only to verify the theoretical constructs, but also to infer the relationship between them (Gioia et al., 2013).

Following the data analysis and triangulation, the proposed framework was revised multiple times based on feedback from my supervisors, academic colleagues during conferences and some of the interviewees. Finally, the proposed framework which is the core contribution of this study was developed and presented in Figure 6.2 chapter 6.

The rationale for document analysis lies in its role in methodological and data triangulation, the immense value of documents in case study research, and its usefulness as a standalone method for specialised forms of qualitative research. Understandably, documents may be the only necessary data source for studies designed within an interpretive paradigm, as in hermeneutic inquiry; or it may simply be the only viable source, as in historical and cross cultural research. In other types of research, the investigator should guard against over-reliance

on documents. Table 4.4 summarise the analysis of the document review and Table 4.5, show the codes and themes obtained through document analysis and thematic analysis.

Table 4-4 Document analysis summary

Stage in the Analysis of document	Data used	Analytical Procedures	Analytical Outcomes
Step 1: Constructing a case history focus on the evolvement of SWS and its features since its launch in the port of Abidjan in 2014.	-Stakeholders archive (Annual report, videos, strategic planning, strategy presentations to external audiences, product and marketing guidelines and newsletters in various formats (Pdf, PowerPoint, and Words))	Thematic analysis Document analysis	-Ivorian SWS features (Appendix 12) -Implementation status of the Ivorian SWS (section 4.5.2; Table 4.1) -Comparison of the Ivorian SWS with the “Evolutionary development model of Single Window” (Figure 4.1)
Step 2: Investigating the different regulations, challenges and stakeholders involve in SWS implementation in the port of Abidjan.	-Stakeholders archive (Annual report, videos, strategic planning, strategy presentations to external audiences, product and marketing guidelines and newsletters in various formats (Pdf, PowerPoint, and Words))	Thematic analysis Document analysis	-Stakeholders involve in SWS implementation (Appendix 6) -Challenges influencing SWS (section 4.5.3, Table 4.2) -E-government policy in Cote D’Ivoire (Table 4.5) - Terms and conditions of use of the SWS platform (Table 4.5)

4.8.2 Criticality assessment of factors’ based on document analysis

The data from company document was coded at first level using both the document analysis and thematic analysis to obtain a list of factors influencing SWS implementation in the port of Abidjan as can be seen in Table 4.5.

Table 4-5 Codes identified during secondary data analysis

Codes		Themes
1	Fully paperless module	Level of implementation
2	Not fully paperless module	
3	Developed or being developed not in use	
4	Not developed	
5	Inadequate ICT Infrastructure	Challenges / Critical factors
6	Lack of Top management support	
7	Resistance to change from personnel	
8	Lack of financial resources	
9	Lack of strong political will	
10	Inadequate legal Framework	
11	Lead agency's lack of clarity and inclusion	
12	Lack of partnership & collaboration among stakeholders	
13	Fear of security and privacy	
14	Political instability	

At a second level, the factors' criticality was assessed using three categories (High, medium, Low) for coding as described in section 6.2.

The coding of the criticality was mainly done using the implementing company's documents, which provides an overall perspective of the project factors from all the stakeholders involved.

Table 4.6, specifically highlights factors scoring "high", meaning they are key to SWS implementation according to document analysis. In other words, "High" indicates at some point, one or more stakeholders have experienced a stagnation in the process as a result of these factors.

Below is an excerpt from the implementing company's documents confirming this:

“Since the beginning of the implementation of the SWS, the different stakeholders have encountered various challenges that caused stagnation at different levels of implementation with different stakeholders. As an example of challenge it can be mentioned: Lack of top management support; Resistance to change from staff; Inadequate legal framework; Lack or insufficient collaboration & trust among stakeholders; Fear of security & privacy; power cut etc.... However, it is important to note that in no case the problem of finances, and the competence of the implementing company were a cause of stagnation for the implementation process of the SWS.” (GUCE-CI, 2021)

Table 4-5 Summary of stakeholders' perception of factors key to SWS implementation based on document analysis.

Critical factors		"High" category based on Document analysis
1	Inadequate ICT Infrastructure	*
2	Lack of Top management support	*
3	Resistance to change from personnel	*
4	Lack of financial resources	
5	Lack of strong political will	*
6	Inadequate legal Framework	*
7	Lead agency's lack of clarity and inclusion	
8	Lack of partnership & among collaboration stakeholders	*
9	Fear of security and privacy	*
10	Political instability	*

4.9 Constructing a case history of the Ivorian port

4.9.1 Overview of the Abidjan port

Côte D'Ivoire has the largest economy in francophone Sub-Saharan Africa, and the third largest in West Africa, with a population of 26.3 million, and a GDP of \$61.502 billion (Dutta & Lanvin, 2020). The Ivorian economy is heavily dependent on the maritime industry, particularly the port of Abidjan for exporting and importing essential materials that are vital for agricultural production, machinery, and other consumption needs. The Port of Abidjan, with a throughput of around 650,000 twenty foot equivalent units (TEUs) per year, handles 80% of the country's maritime traffic, and has the third largest freight volumes among the 25 ports in West African coast (between Dakar and Lagos). This is due in part to its role as a gateway for the landlocked countries of Burkina Faso, Mali and Niger (PAA, 2020). As a result, the Ivorian government introduced the Single Window System (SWS) in the port of Abidjan in 2013 to facilitate trade and drive port competitiveness. Despite its benefits, the SWS implementation is a very complex and costly undertaking that requires great efforts, cost, a change of mindset, and most importantly, political will from the Ivorian government. As SWS is new and narrowly researched in Côte D'Ivoire, there is no research on the critical factors that influence SWS implementation in the port of Abidjan.

4.9.2 Implementation status of the Ivorian SWS

Based on data gathered from documents produced by the implementing company, the table here under (Table 4.7) shows the level of implementation of the 19 modules that the implementing company intend to implement for an entirely paperless SWS in the port of Abidjan. The modules represent IT systems that allow the interaction of several stakeholders via the SWS platform.

Table 4-6 Implementation status of the Ivorian SWS

Ivorian SWS Modules						
	Modules	Fully paperless	Not fully paperless	Developed or being developed not in use	Not developed	Main stakeholder
1	e-forex	✓				(Org 13) / (Org 11)
2	e-licence	✓				(Org 6) / (Org 7)
3	e-manifest	✓				(Org 2) / (Org 9) / (Org 3) / (Org 5)
4	e-mouvement				✓	(Org 12) / (Org 2)
5	e-paiement			✓		All stakeholders
6	e-phytosanitary		✓			(Org 7)
7	e-risk	✓				(Org 3)
8	e-sad / DAU		✓			(Org 3)
9	e-transshipment			✓		(Org 12) / (Org 9)
10	e-voyage	✓				(Org 2) / (Org 9)
11	Collaborative e-visit			✓		(Org 3)
12	Exemption			✓		(Org 3)
13	Insurance Certificate	✓				(Org 14)
14	Certificate Of Origin			✓		(Org 11) / (Org 3)
15	Timber			✓		(Org 11)
16	Request for value certificate	✓				(Org 3) / (Org 11)
17	Certificate of conformity	✓				(Org 11)
18	Trade transaction	✓				(Org 11)
19	Integral Bsc	✓				(Org 5)

Source: GUCE-CI (2021)

The purpose of collecting data from stakeholders' documents is to achieve the aim of this study as worded in section 1.3. To this end, the data obtained from stakeholders' documents made it

possible to identify 19 modules (Table 4.6) that the implementing company intends to implement in order to obtain completely dematerialized SWS in the port of Abidjan. Of these 19 modules, it is revealed that 10 modules are fully paperless, 2 modules are not fully paperless, 6 modules are developed or being developed and not in use. In addition, one module has yet to be developed. The data also shows the different stakeholders that are concerned by these modules. From the official launch of the project in 2013 until the date of this study in 2021, it has been seven (7) years.

Documents from Guce-ci confirm the following:

“The initial contract signed between the State of Côte D'Ivoire and Webb Fontaine gave the implementing company a period of five years to implement a completely dematerialized SWS in the port of Abidjan.” (GUCE-CI, 2021).

Due to a variety of factors, this deadline was not met. In PowerPoint presentations, officials of the implementing company raised difficulties, which caused this delay. Following the document analysis and the thematic analysis of stakeholders' documents, some codes and themes were obtained as can be seen in Table 4.5 (section 4.8.2).

4.9.3 Comparison of the Ivorian SWS and the UN evolutionary development model of SWS

This section focuses first on comparing the Ivorian SWS with the “Evolutionary development model of Single Window”. Secondly, it indicates the completion stage of the Ivorian SWS at every level of the implementation process.

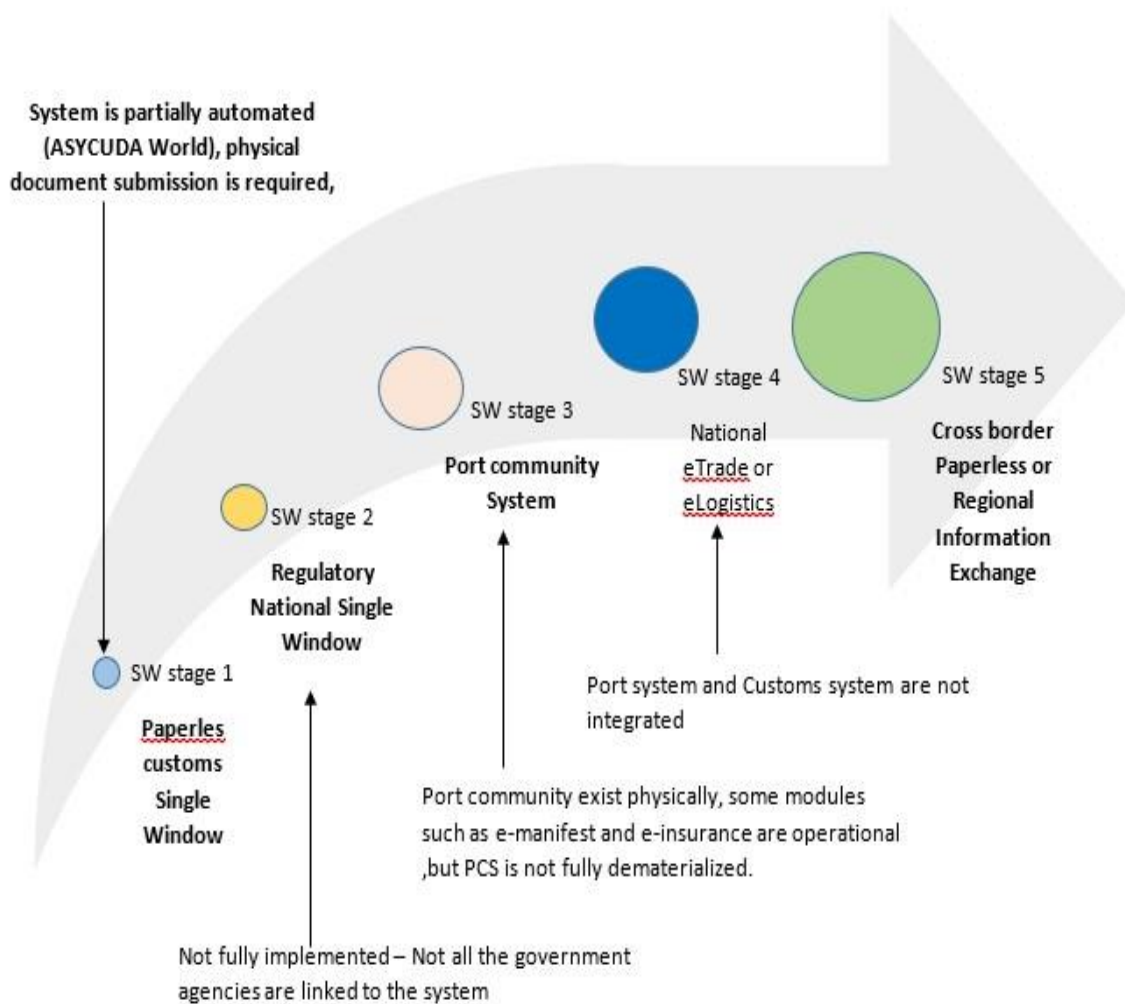


Figure 4-2 Comparison of the Ivorian SWS with the “Evolutionary development model of Single Window”

Table 4-7 Comparison of the Ivorian SWS with the “Evolutionary development model of Single Window”

Levels / Stages	A Single Window Road-map in five evolutionary stages (UNECE 2011)	The Ivorian SWS	Percentage of completion
Stage 1	Paperless Customs	Not fully implemented	90%
	e-Payment for Customs Duty	Fully implemented	100%
	Container Loading List	Fully implemented	100%
	Simple e-Documents Exchange with Port Authority and/or Terminal Operators	Not fully implemented	50%
Level 2	Connecting Other Government Backend IT systems,	Not fully implemented/ Partially manual	50%
	e-Permit Exchange with Paperless Customs System	Not fully implemented/ Partially manual	50%
Level 3	e-Documents Exchange stakeholders within the (air, sea, dry) port community	Not fully implemented (Only implemented for Ships Agent & Terminal operators.)	30%
Level 4	An integrated national logistics platform with also traders and logisticsservice providers information exchange	Traders, Some Banks & Freight Forwarders are connected to the SWS. But the Port of Abidjan systems is not integrated to the SWS platform.	40%
Level 5	A regional information-exchange system	Not implemented	10%

Source: GUCE-CI (2021)

Developing countries, including Côte d’Ivoire, encounter difficulty in implementing their SWS (Peterson, 2017). Indeed, the implementation of the SWS of Côte D’Ivoire began in 2013. Seven years after the SWS implementation, Côte D’Ivoire has still not reached the ultimate objective, which is a total dematerialisation of the SWS in the context of import and export operations through the Port of Abidjan, which represents 90% of its foreign trade. This is useful to understand the specificity of implementing the Ivorian SWS. SWS implementation research in developing countries and Côte d’Ivoire, in particular, has called for research to provide strategies to support the engagement of all stakeholders, foster their knowledge and

understanding of the significance of key factors that affect SWS implementation. This is at the heart of what the current research aimed to achieve.

4.9.4 Governance of the Ivorian SWS

A significant success factor in the implementation of a Single Window is the governance aspect, which combines a number of strategic elements (Torlak et al., 2020). In the port of Abidjan, the Build-Operate-Transfer (BOT) approach of the Public Private Partnership business model (see section 2.4.2) is being used for the implementation of SWS. This approach to describing PPP for the SWS project captures legal ownership and control of the project assets (Delmon, 2015). Under the SWS BOT project, the private company owns the project assets until they are transferred at the end of the contract to the government or public agency. Currently, the Ivorian government holds 70% of shares while a private partner (Web-Fontaine) holds 30% (GUCE-CI, 2021) with the end goal that all of Web-Fontaine shares will transfer to the government at the end of the contract duration. In terms of governance, the SWS project in the port is overseen by the Ministry of Commerce as the lead agency (GUCE-CI, 2021).

In line with the above BOT approach, the Ivorian government has chosen the Ministry of Commerce as the lead agency because it finds it more representative and able to federate all the stakeholders involved in foreign trade (GUCE-CI, 2021). This approach of the Ivorian government is contrary to the proposal of Wang (2016) who suggests customs as the best lead agency for a successful implementation of SWS in the port.

The importance of the choice of lead agency comes from the fact that to be able to provide adequate services accessible to all stakeholders, the pool of the Single Window governing body should include all stakeholders in the Foreign Trade community (all public and private entities concerned by the Single Window) (Jovic et al, 2021). As a result, the supreme governing body

of the entity in charge of the Single Window should be representative of the whole Foreign Trade chain, notably in the case of a PPP model, so as to avoid interest being oriented towards a single organization. In other words, the relevance of the services provided by the Single Window depends on the integration and involvement of the partners - public and private - in Foreign Trade, hence the importance of choosing an effective lead agency (Wang, 2016).

4.10 Thematic analysis and data interpretation of semi-structure interviews

According to Saunders et al. (2016), a thematic analysis is one of the principal methods for analysing qualitative data. Edwardson & McManus (2007) recommend a thematic content analysis to develop nascent theories after collecting qualitative data. This thesis research employed an inductive approach, which would be compatible with Saunders et al. (2016) thematic analysis of inductive approaches. Moreover, the author asserts that thematic analysis is useful for examining the attitudes and perceptions held by individuals and groups; as well as for examining factors that influence phenomena.

By using thematic analysis for this study, the researcher could relate interview data on the implementation of SWS for the import and export of goods via the port of Abidjan to existing theory in order to derive insights into its potential.

Similarly, Saunders et al. (2016) describe the twofold movement in the thematic analysis of linking data to existing theories, on the one hand, and gaining new theoretical insights, on the other hand. Bryman & Bell (2015) argue that there is often a misunderstanding about how themes are identified within the thematic analysis and suggest that considering the frequency of certain content would be a helpful way to identify themes. The research adopted Saunders et al. (2016) approach by linking the factors and sub-factors identified from primary and secondary data to the TOE framework. Furthermore, the author identified themes by grouping

the codes/sub-factors according to their similarity. The author transcribed all the interviews from audio records. The coding of the interviews transcripts was done in English. The coding script (Appendix 7) was also used for peer coding by an independent the researcher, who verified the structure and the coding areas identified by the author. The coding was confirmed with no significant changes following the discussion on major thematic content areas. For the coding of all 14 interviews, the author applied a thematic coding approach. The coding process involved recognising (seeing) an important moment and encoding it (seeing it as something) prior to the process of interpretation (Boyatzis, 1998). A “good code” captures the qualitative richness of the phenomenon (Boyatzis, 1998, p. 161). Encoding the information organises the data to identify and develop themes from them. Boyatzis defined a theme as “a pattern in the information that at minimum describes and organises the possible observations and at maximum interprets aspects of the phenomenon” (Boyatzis, 1998, p. 161). The chart shown in Figure 4.3 represents the different stage of coding used by the researcher to analyse the primary data thematically.

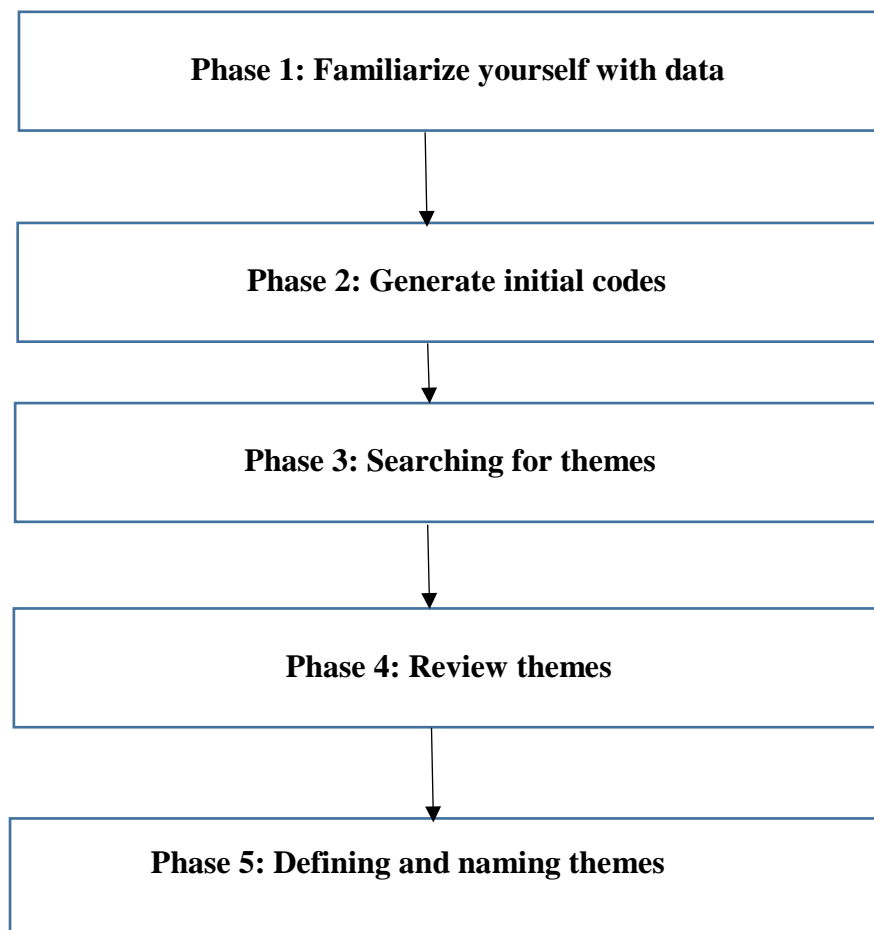


Figure 4-3 Five stages of thematic data analysis

Phase 1: Familiarize yourself with data.

Braun and Clarke (2006) recommended that researchers read through the entire data set at least once before beginning coding, as ideas and identification of possible patterns may be shaped as researchers become familiar with all aspects of their data. In this study, the researcher read and re-read the transcripts to better understand data.

Phase 2: Generate initial codes.

The second phase began after the researcher had read and familiarised himself with the data (responses from interviewees), having ideas about what is in the data and what is interesting about them, as suggested by (Braun & Clarke, 2006). This phase involves the initial production

of codes from the primary data (Transcripts). Thus, the researcher produced 20 initial codes from the data, as shown in Table 4.9. According to Savage (2000), qualitative coding is a process of reflection and a way of interacting with and thinking about data. Following King's (2004) suggestion during coding, the researcher identified essential sections of text and attached labels to index them as they relate to a theme or issue in the data.

Table 4-8 Codes identified from primary data

Codes	
1	Unstable internet
2	Lack of computer literacy and e-readiness
3	Complex SWS
4	Software incompatibility
5	Lack of top management support
6	Resistance to change from personnel
7	Insufficient clarity & inclusion
8	Cost of training & ICT equipment acquisition
9	Inadequate legal framework
10	Lack of strong political will
11	Lack or insufficient collaboration & trust among stakeholders
12	Fear of security & privacy
13	Power cut
14	Dependence on foreign technical know-how
15	Tech skills gap
16	Technological unemployment
17	Poor quality service
18	Delivery gap
19	Sustainability
20	Political Instability

Phase 3: Searching for themes.

According to Braun & Clarke (2006), this phase involves sorting and collating all the potentially relevant coded data extracts into themes. In other words, the third phase begins when all data have been initially coded and collated, and a list of the different codes identified across the data set has been developed. According to DeSantis and Ugarriza (2000), a theme captures and unifies the nature or basis of the experience into a meaningful whole. Boyatzis (1998) suggested that a theme may be initially generated inductively from the raw data or generated deductively from theory and prior research. Thus, the researcher developed nine themes from the literature review in this study. The nine predefined themes comprise the nine critical factors influencing SWS identified through the literature review. These nine predefined themes were used to group the 20 codes based on their similarities under the nine codes, as can be seen in Table 4.9 and Table 4.10. This confirms the researcher's use of a hybrid approach of qualitative methods of thematic analysis (Boyatzis, 1998). Apart from the ninth predefined themes, a tenth theme, "Political instability", specific to the port of Abidjan (Côte D'Ivoire), was identified.

Table 4-9 Matching of Themes (Factors) with corresponding codes describing challenges to SWS implementation.

TOE Context	Themes (Factors)	Code
Technological context	ICT Infrastructure	Unstable internet
		Lack of computer literacy and e-readiness
		Complex SWS
		Software incompatibility
		Power cut
Organisational context	Top management support	Lack of top management support
	Change management	Resistance to change from personnel
	Lead agency role	Insufficient clarity & inclusion
	Financial resources	Cost of training & ICT equipment acquisition
Environmental context	Legal Framework	Inadequate legal framework
	Government support	Lack of strong political will
	Partnership & collaboration among stakeholders	Insufficient collaboration & trust among stakeholders
	Security and privacy	Fear of security & privacy

Table 4-10 Matching of themes (Factors) with corresponding codes describing risks to SWS implementation.

TOE context	Themes (Factors)	Code
Technological context	ICT Infrastructure	Dependence on foreign technical know-how
		Tech skills gap
		Technological unemployment
Organisational context	Top management support	Delivery gap
	Financial resources	Sustainability
Environmental context	Political Instability (New critical factor)	Political Instability

Phase 4: Review themes

The fourth phase begins once a set of themes has been devised, and they now require refinement (Braun & Clarke, 2006). During this phase, the researcher reviewed the coded data extracts for each theme to consider whether they appear to form a coherent pattern. At this level it was necessary to review the themes to make them more specific. This resulted in the themes shown in Table 4.12 The validity of individual themes has been deemed to determine whether the themes accurately reflect the meanings evident in the data set as a whole (Braun & Clarke, 2006). Further, the researcher invited an independent researcher to code the transcripts as well. The results were compared, and no significant modifications to the code and predetermined themes were required.

Table 4-11 Themes reviewed

Critical factors / Themes	
1	Inadequate ICT Infrastructure
2	Lack of Top management support
3	Resistance to change from personnel
4	Lack of financial resources
5	Lack of strong political will
6	Inadequate legal framework
7	Lead agency's lack of clarity and inclusion
8	Lack of partnership & collaboration among stakeholders
9	Fear of security and privacy
10	Political instability

Phase 5: Defining and naming themes

During the fifth phase, the researcher determined what aspect of the data each theme captured and identified what was of interest and why, as suggested by Braun & Clarke (2006). Consequently, for each theme, the researcher wrote in the following sections a detailed analysis, identifying the story that each theme tells.

4.11 Research quality

This research can only be of quality if its reliability and validity are explored. As Pettigrew & Roberts (2006) point out, validity and reliability are other key factors determining research quality. Both aspects of quality are discussed in the following sections. Various authors argue the difference between validity and reliability in qualitative research. Shea et al., (2009) define them as trustworthiness, rigour and quality of qualitative research. The following two sections provide an overall assessment of the research's quality through triangulation and theoretical saturation. The following two sections provide an overall assessment of the research's quality through triangulation and theoretical saturation.

4.11.1 Triangulation

Triangulation refers to the process of applying and combining multiple research methods in the study of a certain phenomenon. Cohen and Manion (2000: pg. 372) define triangulation as the "attempt to map out, or explain more fully, the richness and complexity of human behaviour by studying it from more than one standpoint. According to O'Donoghue and Punch (2003: pg. 247), triangulation is a "method of cross-checking data from multiple sources to search for regularities in the researched data." Triangulation involves using manifold data sources in an investigation to generate understanding, it can be primary or secondary data sources taken in place simultaneously. Some consider triangulation as a method to substantiate findings and as a test for validity. This notion is, however, controversial. It supposes that a weak point in one method will be compensated for by another method, and that it is always feasible to build sense between diverse accounts. Researchers like Denzin (1978), Patton (1999) and Stake (2005) identify types of triangulation used in social research namely data source triangulation,

investigator triangulation, theory triangulation, and methodological triangulation. The research utilised three (3) types of triangulation to ensure the validity and reliability of the findings.

4.11.1.1 Methodological triangulation

Methodological triangulation is concerned with checking out the consistency of findings generated by different data collection methods. It is the use of more than one method for gathering and analysis of data in studying the same phenomenon (Thurmond, 2001). In this study, document analysis was used as a second research method to review document for the purpose of gathering facts (Pershing 2002) to supplement the thematic analysis of data from semi-structured interviews. In this study, document analysis enabled the researcher gain background information to supplement the primary data, to inform the development of the interview protocol, to trace historical events, to track development and to verify the findings from the semi-structure interviews (MacKieson, Shlonsky and Connolly, 2018; Bowen, 2009). In this regard, various methods can be used to study a given phenomenon. If the conclusions from each of the methods are the same, then validity is established.

4.11.1.2 Data triangulation

Data triangulation entails using different sources of information in bid to increase the validity of a study. “Data triangulation implies the collection of accounts from different participants in a prescribed setting, from different stages in the activities of the setting and, if appropriate, from different sites of the setting” (Taylor & Tindall 1994: pg. 146). It also involves the crosschecking of the consistency of given factual data items from different sources through various methods at different times (Patton 1990). According to Quintão & Andrade (2020), a case study's reliability is fundamentally demonstrated by a data triangulation. As part of the triangulation process, Fusch et al. (2018) discuss the importance of using various sources for

data, such as interviews with multiple participants or multiple archival sources. To ensure data source triangulation, the preliminary codes from the different data sources were compared for congruence (Merriam and Tisdell, 2016). Thus, for this research semi-structured interview data from the 14 respondents from 14 different public and private organisations, together with data from online public sources were triangulated for congruence.

4.11.2 Investigator triangulation

Investigator triangulation involves the participation of two or more researchers in the same study to provide multiple observations and conclusions. For the purposes of this research, this was achieved through validation of codes derived from the thematic analysis by a research colleague within the same field. The data from the interviews were given to a colleague to ascertain or check for similarity in the themes or perspectives generated from analysing the research data. The goal of this form of triangulation was to achieve both the confirmation of findings and insights from different perspectives, thereby adding breadth to the phenomenon of interest (Denzin, 1978).

Most instances of investigator triangulation lies in studies using qualitative methods, usually where coding of data is required, and are broadly self-similar (Turner and Turner, 2008). Triangulation here is confirmatory in nature and a means of demonstrating the reliability of the coding instrument rather than challenging conclusions. In this research investigator triangulation was achieved through corroboration with involvement of an independent researcher.

In summary, as seen above through the different type of triangulation used in this research contributed to improving its validity by enabling the research to be viewed from multiple

intersecting perspectives. In essence, the qualitative research approach is not only strengthened, but also empowered by implementing triangulation.

4.11.3 Theoretical saturation

Theoretical saturation is a speculative construct. At critical moments, the researcher decides that the material collected, and the theory organising that material, are not shifting, or adding new insights, and the decision that the project is complete and ready for dissemination is made. This is the moment when the researcher believes that theoretical saturation has been approximated. Fusch and Ness (2015: p. 1408) claim categorically that “failure to reach saturation has an impact on the quality of the research conducted”. Morse (2015: p. 587) notes that saturation is “the most frequently touted guarantee of qualitative rigor offered by authors”. In order to ensure sufficient data collection, theoretical saturation was first sought in this study. Theoretical saturation can be divided into several layers of judgment. These layers occur at several critical moments in the research process. In this study the saturation was justified at two levels which are:

What level of sampling has been used to create the case study? Have the relevant stakeholders been thoroughly sampled?

As part of this study, the sampling was carried out taking into account the complete list of stakeholders connected to the SWS platform in the port of Abidjan. In other words, the 13 stakeholders selected for the semi-structured interviews represented all of the stakeholders necessary for this research to gain insight and contribute to the theory on SWS implementation.

Therefore, no further sampling was necessary. Based on this fact, it can be said that the relevant stakeholders have been thoroughly sampled. Thus, it can be concluded that theoretical saturation was achieved at this first level.

The next layer assessed the kind of empirical materials that were collected from each stakeholder.

According to Glaser and Strauss (1967) the researcher becomes empirically confident that a category is saturated once he or she sees similar instances repeatedly. In other words, saturation means that no additional data are being found.

After having interviewed the 14 respondents, it was noted that there was a redundancy in the information given. It emerged from the responses that the stakeholders are all subject to the influence of the critical factors to varying degrees, as shown in Table 6.3, Table 6.4, Table 6.5, Table 6.6. In view of the redundancy noted in the data collected, one can conclude that theoretical saturation has been reached at this second layer.

Theoretical saturation is about the confidence that a research project offers a credible representation of the entity it purports to study. The concept enables researchers to express confidence that the research was thorough and ready for dissemination. Without theoretical saturation, researchers' findings could be described as based on thin data. However, depending upon a theorist's epistemological orientation, the concept of saturation may be deemed irrelevant. The notion of saturation is not applicable to postmodern theorists, because it is meant to represent a construct of completeness. Postmodern projects reject this representational essentialism. Saturation reflects analytical foci that draw more from realist orientations than radical relativist ones.

Conclusion

This chapter presented the theory of data. It summarised the epistemological positions, explaining why the interpretivist or social constructivist paradigm was chosen. In the context of information systems, interpretivism aims to understand how the system influences and is influenced by the context. It also produces rich qualitative data (Walsham, 1995; Yin, 2009; Collis & Hussey, 2009). Furthermore, the researcher justified the choice of the qualitative analytical approach as it suited the examination of the SWS phenomenon that the instrumental case study approach sought to unfold. The strategy, dimensions, and case study protocol of the research were also discussed. Fourteen different public and private stakeholders involved in the implementation of the Ivorian SWS provided primary data for analyses via online and web based interviews.

Chapter Five Analysis of data and research findings

5.1 Introduction

This chapter presents the analysis of the research results. For qualitative data used in this study, analysis refers to the meaning given to the different categories selected and their relationship. The analysis allows for the identification of essential elements from the data, which will be the basis for interpretation or evaluation. During the research, ten (10) critical factors (or themes) were identified from the literature review, document analysis and semi-structured interviews. These critical factors contain sub-factors that allow the information collected during the interviews to be coded. The results of the research will be analyzed based on the research aim and its objectives.

5.2 Analysis of the result of primary and secondary data

In qualitative research, data collection, data analysis, and report writing are not always distinct step; they are often interrelated and occur simultaneously throughout the research process, as suggested by Creswell (2002). According to Thorne (2000), it is important to identify that the data analysis process may not be entirely distinguishable from the actual data because data collection and analysis may happen concurrently. Although thematic analysis, as documented by Braun and Clarke (2006), is presented as a linear, six-phased method and reflective process that develops over time and involves a constant moving back and forward between phases.

In this study, thematic data analysis was used at the primary and secondary data collection stage to organize and simplify the complex data into meaningful and manageable codes, categories, and themes, as described in section 4.10 (Table 4.9, Table 4.10 and Table 4.11). Document analysis is added value to this research due to the paucity of studies on SWS

implementation in the port of Abidjan, and also serve as a triangulation tool. Merriam (2009) suggests that thematic data analysis takes place simultaneously with data collection and preliminary analysis, with the analysis increasing in intensity as the analysis proceeds. Braun and Clarke (2006) suggested that the thematic analysis runs iteratively during data collection to provide a potentially rich and detailed yet complex account of the data to the researcher. In this study, qualitative thematic analysis was used as the analytical method.

Following the thematic analysis of the secondary and primary data, ten critical factors and 19 codes were identified. As part of this study, a link was established between these ten critical factors and the 19 codes (as seen in section 4.10), and subsequently, these data were analysed in the following sections. The following sections will be focused on the ten (10) themes and 19 codes, highlighting how these codes relate to and inform the themes (Critical factors).

5.2.1 Inadequate ICT infrastructure

□ The complexity of the SWS

Based on the implementing company's document analysis, the Ivorian SWS was originally designed and implemented by a private company, but subsequently replaced by a state-owned company after its contract expired in 2019. This type of ownership refers to the top-down approach, described by Marek (2017), where the ownership style is more like a public style, with key stakeholders such as port authorities and public bodies determining implementation speed and setting targets in the development of the SWS. Ports such as Port of Valencia, Port of Rotterdam and Amsterdam belong to public model of SWS (Tijan, 2020). If the ownership model is of a private kind, the so-called bottom-up approach would be implemented in the SWS implementation (Marek 2017). Ports such as port of Singapore, Hamburg, Felixstowe belong to that kind of PCS model (Tijan, 2020).

The Ivorian state-owned implementing company regularly organises training for stakeholder staff to facilitate the use of the SWS. This was confirmed through document analysis of the port of Abidjan as a beneficiary of the trainings. “These trainings are carried out either based on a programme developed by the implementing company or at the request of the stakeholders” (PAA, 2021).

Despite the effort made by the implementing company to simplify the use of the SWS, interviews revealed that some stakeholders, such as freight forwarders, shipping agents, and importers/exporters, have difficulties using it.

According to the participant,

“When it comes to processing formalities with the customs, it is easier to use the Customs IT system ASYCUDA than the SWS. This is due to the fact that the SWS is not fully independent. It dependent on the customs IT system ASYCUDA to process data.” (P10)

A document analysis of the customs revealed that SWS is dependent on ASYCUDA, which is the customs' IT system, so when ASYCUDA is unavailable, several modules that are directly tied to it are inactive. Even when the ASYCUDA system is updated without the knowledge of the implementing company, it disrupts the SWS. “Every time the ASYCUDA system is updated, the SWS need to be automatically updated; otherwise, it will stop running” (Douanes-ci, 2022).

The challenges encountered by the Forward agent have led them to use often the ASYCUDA system instead of the SWS. The ASYCUDA system presents the advantage of operating without the internet. “It is based on a direct EDI connection between the Customs and the stakeholders” (Douanes-ci, 2022).

It is important to note that the complexity of the SWS is mainly due to its pairing with the ASYCUDA system. .

□ Software incompatibility

The implementation process of the SWS in the port of Abidjan encountered difficulties related to

“the difference in the IT systems Software used by the implementing company and the IT system of the port of Abidjan.” (P2)

The incompatibility between the two software made a direct connection impossible. Therefore, the implementing company had to

“ provide the port of Abidjan with a special server to connect the port IT system with the SWS.” (P2)

The server is a bridge between the SWS and the port IT system. This was confirmed through the document analysis, which revealed that: “The port authorities cannot receive electronically the manifests that shipping agents make available on the SWS platform to complete the various administrative formalities on the arrival of the ship” (PAA, 2021). The shipping agents are obliged to forward the manifest manually to the port authority. On the other hand, the customs authority, which has an adapted computer system, receives the manifest sent by the shipping agents through the SWS platform without needing to send a manual version. The interviews with the various stakeholders have revealed that the implementation of paperless SWS in the port of Abidjan is challenging due to the incompatibility of the port IT system with the SWS software. This was confirmed by Kambui et al. (2019), when looking into the benefits of implementing SWS in the port of Mombassa, Kenya. His findings showed the need for the

Kenyan government to establish an effective ICT infrastructure to achieve an entirely paperless system. Furthermore, Aryee et al. (2021) revealed that ICT infrastructure was a significant factor in affecting the implementation of SWS in the port of Tema, Accra-Ghana.

□ Unstable internet & Power cut

Throughout the interviews, the responses given by the participants showed that the supply of internet and electricity is unstable in their activities. Based on document analysis, it is confirmed that the supply of electricity directly affects the supply of internet, since there would be no internet without electricity. Therefore, power shortages in most West African countries pose a serious obstacle to deploying the internet, which is crucial for the implementation of SWS (IPCOEA, 2021). There is evidence to support this by Dutta et al (2020), who state that e-traders in developing countries may be without access to the internet, encounter slow connections, or pay high usage rates. Even with access, they may not have the digital skills to use new IT systems or services or be able to maximize the advantage of going paperless.

Further, the participant highlighted that:

“After a blackout or an internet interruption, any previous work gets duplicated, which sometimes leads to the payment of penalties. In order to overcome these issues, we suggest the government to provide a stable electricity power and a bigger internet capacity”. (P10)

The internet can be very slow, unavailable, or unstable, as some interview responses show.

“Power cut recently has become recurrent. On top of that the internet can be very slow sometime or even unavailable”. (P4)

“Since the beginning of the implementation of the SWS in 2014, the internet has not been very stable. Although, there has been some improvement since then. And Hum... recently now we are experiencing power cuts that also affect the internet.” (P6)

This is the reason given by respondents for preferring to use the old system, which does not depend on the internet:

When the customs IT system is down, we can't work on the SWS. All the challenges mentioned caused dissatisfaction and protest among the personnel who wanted to carry on working with the old system ASYCUDA that did not require internet.” P9

“Hum the internet can be very slow sometime or not available at all. The reason why the internet is now an issue, is because the Single Window Systems is web based.... Hum our own system, the ASYCUDA does not require the internet.” (P3)

Following these cuts, stakeholders are forced to either suspend their activities until the power or internet resumes or switch to the ASYCUDA Customs System to perform certain transactions (Douanes-ci, 2022). The ASYCUDA system, a customs computer data exchange system, operates without the internet. Indeed, the interviews have revealed how critical power cuts and internet instability are for the implementation of the Ivorian SWS.

5.2.2 Lack of top management support

The lack of top management support refers to the difficulty for the resource persons from the management to cooperate with the implementing company of the SWS. Based on document analysis, it was revealed that stakeholders' top management was not always aligned with the implementing company's operations, which in turn affected the timelines of the SWS implementation. In Ghana, Aryee (2021) claims that the introduction of the Single Window platform in the port of Tema had raised scepticism among the various stakeholders' top managers, which caused delays in the implementation process.

“The lack of top management support was very critical for the main stakeholders (The PAA, Government body aligned to tax collection on goods coming into and leaving Côte D'Ivoire, (Org3)) since these stakeholders already had their IT systems that they were developing to digitise their import-export procedures. Therefore, stakeholders saw the integration into the

“

GUCE-CI platform as a process that would lead them to abandon their digitalisation project.”

(P1)

According to the participant, top management has not fully cooperated with the implementing company. This has created delays in the process:

“This factual reality slowed down the procedure for implementing the SWS in the port of Abidjan to such an extent that the first port modules were put in place three years after the start of the project” (P2).

In his research on the Sri Lankan's adoption of the SWS, Abeywickrama (2015), revealed how the process has suffered from lack of top management support and the need for an organisational effectiveness for a successful implementation of the SWS in Sri Lanka.

The lack of top management support from the port authorities also affected the time frame for the implementation of the SWS:

“At the beginning of the SWS implementation process the (PAA) did not support the SWS project because the PAA was already working on a project to set up a PCS, which was suspended after 3 years of development. Also, the PAA already had an IT system that it was using and was in the process of developing to better meet its current needs”. (P2) This resulted in an extension of the project completion time:

"The e-manifest module, which is an essential element of a PCS, was implemented in 2020, six years after the start of the project". (P2)

For various reasons, the implementation of the system was not well regarded by some stakeholders (GUCE-CI, 2021).

For the PAA and Org 3 as main stakeholders of the SWS, it could be a handicap to their prerogatives. As clearly stated:

Org3 management team initially did not support the SWS implementation project because we saw our prerogatives being taken away from us through this project” (P3)

According to the participants, this has contributed in their strong reluctance to participate in the project at the beginning.

“The management team was very reluctant to join the SWS project for various reasons. First of all, we already had an IT system that we did not want to abandon”. (P4) The risk of a cyber-attack was also mentioned:

“Also given the sensitivity of the information we manage in our system; we did not want to run the risk of losing them through a cyber-attack while using the SWS platform.” (P3)

From the shipping agent interview, although there was no top management lack of support, the personnel were reluctant to this project:

“Unlike the management team, the personnel expressed their reluctance to the SWS project.” (P9)

Other top managers did not fully support the SWS for legal reasons. For example, one top manager of a public organisation refused the digitisation of his signature (GUCE-CI, 2021). The reason given by the latter is that he fears that his signature may be fraudulently used since it engages its responsibility at the national and international levels.

Unlike the few public stakeholders, including the two main ones (PAA and Org 3), most of the stakeholders, particularly the private one, did not resist the SWS implementation. In fact,

“

“Considering the numerous benefits of the SWS in term of time and money saving, our top management supported it fully” (P11).

As confirmed by document analysis, insurance companies were added to the SWS platform as stakeholder companies as per their association agreement with the implementing company. Following their request, a module dedicated to Insurers was conceived and implemented in 2015 a year later:

“At the beginning of the SWS project there was no plan to put in place a module relevant to insurance companies. However, considering the benefits of digitalisation through the SWS platform, we approach the implementing company to consider our needs. Following our request, a module dedicated to insurers was inserted in the SWS after a year. This show that the insurance companies requested the project therefore resistance from the management team was never an issue”. (P14)

Overall, document analysis and semi-structured interviews suggest that top managers did not provide adequate support for the SWS implementation in the beginning, but they improved over time. As stated in the interview by the participant:

“Following the various meetings that we had with the lead agency, Ministry of Commerce and the implementing company, we came to an agreement and the module dedicated to our organisation was finally implemented in 2020, which is seven years after the launch of the SWS”. (P4)

“We finally agreed to participate in the SWS project, because we knew we were not going to abandon our IT system”. (P4)

We can conclude that the main cause for this was the lack of sufficient inclusion of the stakeholders in goal setting of the project and lack of clarity at the beginning of the SWS implementation.

According to the participant:

The best solution to the problem of Top management support would be to clearly explain to the managers the goals of the project and implicate them enough into the elaboration of the project". (P1)

5.2.3 Resistance to change from personnel.

An analysis of the results from semi-structure interviews and document review has confirmed the personnel's resistance to change during the implementation of the SWS in Côte D'Ivoire. The personnel resisted change for multiple reasons. According to Moros-Daza et al. (2020), this is an indication of the cultural problem that must be overcome when implementing SWS in developing countries. As Aryee et al. (2021) point out, assessing the impact of SWS platforms in import clearance requires considering how these technologies are embedded in social processes. As a result, he suggests the authorities should recognize the social embeddedness of digital tools, which new providers have paid far less attention to than the purchase and implementation of new equipment.

A subject matter expert participant said:

"Public organisations personnel resisted change because they did not accept the idea that they could not perform physical checks on documents and could no longer physically meet with clients. Private organisations personnel resisted change because they saw a threat of staff reduction within them through the digitisation of procedures." (P1)

“

An analysis of document revealed that the resistance to change among personnel was more prevalent among public stakeholders like customs and port authorities. The customs are used to interact with clients and checking goods and documents manually, which unfortunately encourages corruption. Generally, in West Africa, most government agencies are corrupted, and employees stick to those unethical practices (Peterson 2017). These practices are encouraged by traders who are also not willing to change their current bribery practices. Investigating this further, participants had this to say:

“traders feared that they would no longer have the possibility of negotiating penalties with the customs or port authorities.” (P1)

The SWS can eliminate unethical practices such as bribery, and that is why it is not welcome.

The resistance from Org 3 personnel was later eased through intense negotiations and firmness from the government, which saw the sacking of two IT directors of Org 3.

The private stakeholders’ personnel reason for the resistance was mainly fear of job loss. A participant confirmed this by saying:

“Some of the personnel of the PAA oppose the idea of the SWS, because of fear of losing their jobs. For instance, there are actually almost 100 employees typing manually the information related to the manifest into the port IT system. If we start receiving the Manifest directly from the SWS to our IT system, the entire 100 employees will lose their jobs or, if lucky be relocated.” (P2)

Regarding the fear of job loss, the participant highlighted that:

“This factor was very critical to such an extent that we witnessed the physical threat of the implementing company’s agents, the breakage of their official vehicles.” (P1)

Apart from the fear of job loss, technical challenges in using the SWS caused the personnel from private stakeholders to resist change.

“While using the SWS platform, we encounter disruption due to internet instability, which duplicates the uncompleted work in the ASYCUDA system. Also, the fact that the SWS is running simultaneously with the customs IT system can be a problem. When the customs IT system is down, the SWS stops working.” (P10)

These technical issues created dissatisfaction within the personnel and made them often use the Customs IT system (ASYCUDA) rather than the SWS:

“when the customs IT system is down, we can’t work on the SWS. All the challenges mentioned caused dissatisfaction and protested among the personnel who wanted to carry on working with the old system ASYCUDA that did not require internet.” (P9)

“Hum, the internet can be very slow sometimes or unavailable. The reason why the internet is now an issue is because the single Windows system is web-based.... Hum our own system; the ASYCUDA does not require the internet.” (P3)

Based on the foregoing outcome, it is concluded that the resistance from the personnel was fueled by corruption, fear of job loss and sometime technical issues. In addition, it is important to note that this factor contributed to delaying the implementation of the SWS (Aryee et al., 2021).

5.2.4 Lead agency's lack of clarity and inclusion

The leading agency is responsible for managing the single window implementation program.

Therefore, the single window project must include a strong leading agency as suggested by Wang (2016). Based on analysis of documents, the Ministry of Commerce is the leading agency in Côte D'Ivoire. The government's decision to make the Ministry of Commerce the leading agency was not welcomed by the customs and Abidjan port authority.

“Org 3 in particular did not appreciate that the development of certain customs modules would be entrusted to an external structure. The PAA, on the other hand, did not like the fact that their project to set up a Port Community System (PCS), which started in 2008, was suspended in favour of the SWS.” (P1)

The government had to firmly impose the Ministry of Commerce as the leading agency to avoid any leadership conflict (GUCE-CI, 2021).

Document analysis and semi-structured interviews with key public and private stakeholders have revealed that the leading agency played an important role in the implementation process of the SWS. It was able to promote the SWS appropriately. It helped in partnership with the monitoring committee to facilitate the collaboration among stakeholders. As an example, stakeholders who were unwilling to join the project were persuaded and brought on board.

Despite the success it got, most of the participants agreed to say that:

“Despite the success of the leading agency, it could not do much when it came to getting all the stakeholders to dematerialise fully their system and collaborate.” (P10)

The leading agency did not have nor was backed up by the strong political will needed to compel the stakeholders to abide by the new rules. Therefore, some stakeholders started the implementation process without completing, and nothing could be done to them.

According to a participant:

“The leading agency could not do much against the refusal of some public stakeholders to comply fully by the law that requires them to dematerialise their services fully.” (P1)

This shows clearly that the Ministry of Commerce as a lead agency lacked strong political will, thus making its mission unfulfilled. This reality highlight the relevance of Wang (2006) findings in his study on SWS implementation in the port environment in South Korea. In Wang (2016), he calls for selecting a lead agency that can effectively coordinate the various phases of SWS implementation. According to him, the customs administration would be the best candidate to act as the lead agency for successful implementation of the SWS.

5.2.5 Lack of financial resources

□ Cost of training and ICT equipment acquisition

A successful dematerialisation of import and export procedures requires the acquisition of ICT equipment, software, and the training of stakeholder personnel. During the interviews, the interviewees repeatedly noted that:

“The implementing company provided ICT equipment, and internet free of charge to public stakeholders involved in the project.” (P1)

“The implementing company provided ICT equipment free of charge to public stakeholders like us involved in the project.” (P2)

“This factor was not critical because the state took into account the cost of acquiring all of the computer hardware required for the implementation of the SWS.” (P3)

This is to facilitate the implementation of the SWS by preventing any technical issue that could arise due to a lack of ICT equipment and software. Document analysis confirmed that public stakeholders benefited from the free ICT equipment and software. It means that the cost of acquiring ICT equipment and software was not critical for public stakeholders since they did not have to bear any expense related to the ICT equipment, software, and the internet (GUCE-CI, 2021). On the contrary,

“The private stakeholders had to bear the cost themselves.” (P1)

Document analysis and semi-structured interviews with the stakeholders have revealed that the burden of the cost of ICT equipment, software, and internet has been felt differently among the private stakeholders. Bigger private stakeholders such as Freight forwarder and Shipping Agent did not have to make any major investment to implement the SWS since they already

have the basic ICT equipment and software required. Rather, smaller private stakeholders such as traders (importer and exporter) required new investments.

“For the majority of us, new investments were necessary to acquire the ICT infrastructure and software necessary to implement the SWS. For instance, new computers had to be bought and installments to be made to have the internet connection.” (P11)

Based on document analysis, the majority of traders (importers and exporters) and other small stakeholders do not always have ICT equipment that needs upgrading to be able to use the SWS. Some of them do not have internet facilities. This reality has negatively influenced the implementation of SWS with this particular group of private stakeholders. They have been suffering from a slow internet speed, and some of them have to go to some dedicated centres with ICT and internet facilities for their transactions (GUCE-CI, 2021). The implementing company has made these centres available. As part of its efforts to facilitate SWS implementation, the implementing company has offered free classes and training (GUCE-CI, 2021).

Investigating this further, the participant had this to say:

“This factor has not been critical because from the start of the establishment of the implementing company (Org 8) until now, (Org 8) has implemented a free training policy for the various stakeholders.” (P4)

Based on the foregoing outcome, it is concluded that the cost of training was not critical for the stakeholders.

The private stakeholders had to bear the cost themselves. The majority of private stakeholders did not have to make a big investment to use the SWS (GUCE-CI, 2021).

“Most private and public stakeholders already had the basic ICT equipment (Computers, internet) to use the SWS”. (P1)

However, the cost of ICT equipment and software was critical for most traders (Importers/Exporters) and small stakeholders, unlike bigger stakeholders:

“For most of us, new investments were necessary to acquire the ICT infrastructure and software necessary to implement the SWS. For instance, new computers had to be bought and installments to be made to have the internet connection. And hum, you know hum, the computers, software, and other related gadgets are not always cheap.” (P11)

5.2.6 Inadequate legal framework

Document analysis indicates that massive changes and great investments need to be made to the existing system in order to implement a fully paperless single window system in the port of Abidjan. Therefore, it urges government intervention, especially in policy formulation. In the case of Côte D’Ivoire, when the Single Window System was implemented in 2013, the required legal framework was not in place. Research suggests that governments alone possess the absolute power in setting the boundaries of permissible activities under the law, and adjust the rights and obligations of businesses and their stakeholders (Aryee et al., 2021).

According to a participant:

“In 2014, the Ivorian Government promulgated the following law to help with the issue: DECREE N ° 127 / MCAPPME / MPMB of March 21, 2014. This decree determines the conditions for entry into Côte D’Ivoire of foreign goods of any origin and any provenance and the conditions for the export and re-export of goods to foreign destinations.” (P1)

This law was used as a basic text for SWS implementation, although it does not consider the dematerialisation aspect of trade. As time went on, the government introduced additional rules and regulations that dealt with the risk of a dematerialised trade system. For example, the government introduced the anti-cyber attack laws in addition to other laws that renders an implementing company liable for instances of breach of confidentiality as can be seen in Table 4.3/section 4.7.2.1.

Despite the effort made by the government with the introduction of new rules, the SWS implementation is still facing challenges because some important laws, such as the law on electronic signatures has not yet been promulgated (GUCE-CI, 2021).

Also, the different stakeholders involved in the SWS implementation are governed by various government ministries with different acts of parliament. Therefore, bringing them under a single authority requires efficient and effective coordination to coalesce existing laws and political will in the form of pressure and control by the government. In the same vein, Joshi's (2017) study on India's SWS reveals the absence of a sound legal framework for its successful implementation.

Overall, document analysis and semi-structured interviews with the stakeholders have revealed that despite the effort already made by the government, the lack of sufficient legislature that outlines procedures and mechanisms for digitalisation is preventing a full paperless SWS in Côte D'Ivoire.

5.2.7 Lack of strong political will

Political will is widely acknowledged as a crucial ingredient for implementing impactful policies and legislative reforms. Political will can be defined as the motivation and commitment of political leaders and policymakers to invest their resources, energies and political capital into making these regulatory changes an urgent priority. Developing the political will to formulate and enact regulations around electronic signatures, documents and cybersecurity is vital for transitioning to paperless trade via Single Window Systems. Transforming outdated legal frameworks requires committed leadership from the highest levels of government. Presidents, Prime Ministers and heads of ministries must champion the agenda for progressive digital commerce regulations to signal priority down the ranks. They must actively coordinate agencies, oversee drafting and shepherd legislative passage. Once drafted, prompt passage of bills by parliament and enactment into law signal political will in concrete legislative outcomes, not just lofty rhetoric.

Lack of strong political will refers to the lack of willingness of leadership to enact, introduce, and enforce laws and rules necessary to speed up the implementation of SWS.

A country's economic, epistemological, and organizational sustainability depends on continuing transformation in an ever-changing world. The pace of technological and social innovation is accelerating, and implementing changes has become harder since change is perceived by some stakeholders as disrupting what used to work, which is no more efficient (GUCE-CI, 2021). This is where a strong political will become necessary to implement change.

A document analysis of the implementing company revealed that in order to prevent the SWS implementation failure, the government support is essential. In other words, the government is

the only party who can change the system overnight by bringing an Act of Parliament or making amendments to the existing rules.

According to the participant, there is a need for

“a strong political will to ensure that all the laws necessary for the implementation of a 100% paperless system emerge, that they are promulgated and effectively enforced by the various stakeholders.” (P 8)

In India for instance, Joshi (2017) argued that a speedy implementation of the SWS could be achieved with a strong political will.

Strong political will is indispensable to transform outdated legal frameworks inhibiting paperless trade in developing countries via holistic cyber and e-commerce regulations. Concerted efforts by state and non-state actors are needed to elevate political will through advocacy, expert inputs, leadership renewal and sensitization drives. With robust political commitment, developing countries can enact long-overdue reforms and reap the competitiveness and trade gains of seamless digital commerce.

Overall, insights from the document analysis and semi-structured interviews with stakeholders have revealed that despite the current effort demonstrated by the government, the lack of strong political will is preventing full paperless SWS in Côte D'Ivoire.

5.2.8 Lack of collaboration & trust among stakeholders

The implementation process of the SWS in a port brings different stakeholders under one roof (Kapkaeva et al., 2021). Therefore, ports must interact and engage with a wide range of stakeholders to provide port services effectively and efficiently (Tessmann and Elbert, 2022).

The stakeholders include public authorities and customs, terminal operators, shipping lines, importers, exporters, in-land transport operators, and freight forwarders (Jovic et al, 2021).

According to Jovic et al. (2021) a key characteristic of SWS, which impacts port performance, is collaboration and participation of port and logistic players. Unfortunately, the collaboration between the different institutions involved in implementing the SWS in the port of Abidjan is not perfect as confirmed by document analysis. Bureaucratic attitudes and mind-set of the government officials, hierarchical organisational structures and political agendas prevent the development of collaborative approaches. In Côte D'Ivoire, during the initial phase of SWS implementation, each institution's fear of losing power was rampant (GUCE-CI, 2021). This was confirmed by a participant saying this:

“We did not like the fact that the development of certain customs modules (RFCV, EDAU, etc.) be entrusted to an external structure. (Org 3) saw in this its prerogatives being withdrawn, and high risk of its data being misused.” (P3)

In light of this, Org 3 was not easy to collaborate with, as stated in some interviews:

“At the beginning of the SWS implementation, Org 3 did not collaborate, as it should with the implementing company.” (P3)

“Because some stakeholders were not willing to dematerialise their process fully they were tough to work with.” (P10)

This situation caused delays in the implementation process of the SWS. An interview with public stakeholders revealed that:

“We still need more backing from the government to compel the rebellious stakeholders to abide fully by the law through a full dematerialisation of their system.” (P10)

SWS implementation proved to be difficult because all stakeholders didn't trust one another and didn't collaborate smoothly (GUCE-CI, 2021).

This factor was very critical, especially at the beginning of the project.

This great reluctance to collaborate came from some stakeholders, such as (PAA, Org 3) who already had their IT system.

“The lack of top management support was critical for the main stakeholders (PAA, Org 3) since they already had their IT systems that they were developing to digitise their import-export procedures.” (P1)

According to the same interview, public stakeholders thought they would have to abandon their system to integrate the SWS platform.

“This great reluctance to collaborate came from the stakeholders who already had their IT system. They thought they would have to abandon their system to integrate the SWS platform.” (P1)

Public stakeholders were also disappointed for not being selected to head the project:

“Add to this, PAA and the Org 3 have expressed their dissatisfaction for not having been chosen as the leader of the project.” (P1)

Among public stakeholders, customs were surprised to learn that the development of several modules would be outsourced.

“Org 3, in particular, did not appreciate that the development of their IT modules would be entrusted to an external structure.” (P1)

The same is true of PAA for different reasons:

“PAA, on the other hand, did not like the fact that their project to set up a Port Community System (PCS), which started in 2008, was suspended in favour of the SWS.” (P1)

A document analysis reveals that, after seven years of implementing SWS, the collaboration between different stakeholders has improved but is not yet perfect. It was also noticed that the change of the persons in charge of the different institutions contributed to reviving the tension between the various stakeholders (GUCE-CI, 2021). In other words, new leaders tend to question the business agendas of their predecessors. This leads to the blocking of certain programs initiated by the predecessors. Overall, document analysis and interviews with stakeholders have revealed that the unwillingness to fully dematerialise the process, the fear of losing control and the problem of leadership fueled the lack of collaboration among the stakeholders, which could cause delays in the implementation process of the SWS.

5.2.9 Fear of security and privacy

Based on document analysis, some organisations are not willing to exchange information through a centralised system. Because some of their data may include commercially sensitive information, trade-sensitive information, financially sensitive information (GUCE-CI, 2021). According to Jiang et al. (2021) SWS practice in most ports are centralised platforms, which offer benefits like efficiency and speed, but also present security risks. It is possible, for instance, that the platform itself or the integrity of the information might be compromised. A recent cyberattack known as NotPetya in 2017 demonstrates how centralised systems can be devastating to companies once they are attacked (Jiang et al. 2021).

“The various stakeholders were reluctant to join the project because of their concern to see their systems being attacked by viruses or hackers.” (P1)

“While participating in the SWS implementation, we fear that the data we share on the SWS platform will be hacked and used by competitors. We expressed serious concern about this issue at the beginning of the project.” (P2)

The stakeholders usually believe that there is a higher risk of misuse and abuse of information submitted and maintained in electronic form, and their minds are set to approve physical documents (Moros-Daza et al 2020). This reality makes them reluctant to participate in the SWS process. In addition to these factors mentioned above, in Côte D’Ivoire, electronic documents are not accepted as evidence by the various public and private administrations, including in court (Dutta & Lanvin, 2020). The degree of fraud and corruption in the country leads the multiple administrations to take strict measures in generally requiring the originals of documents in the various import and export transactions (Peterson, 2017).

Document analysis and semi-structured interviews with all the stakeholders proved that fear of security and privacy has been a significant issue for most stakeholders at the beginning of the SWS implementation. Thus, the implementing company proved that the system was safe, which delayed the project for one year.

“To reassure the stakeholders, the implementing company carried out tests over some time with multinationals such as Bolloré Africa Logistics to prove the reliability of the SWS platform before they could participate.” (P1)

Despite the successful tests, the stakeholders still have some concerns due to the rapid evolution of technology, which sees the birth of improved versions of cybercrime. Regarding the issue, a participant had this to say:

“Although the implementing company has reassured us of the safety of their software, we recommend they keep updating it considering the evolving nature of the ICT field.” (P9)

5.3 Risks influencing SWS implementation in the port of Abidjan

5.3.1 Dependence on foreign technical know-how

Dependence on foreign technical know-how consists of a short or long-term reliance on machines and techniques imported from abroad to satisfy local demand.

The rapid spread of technology fueled by the internet has led to positive cultural and economic changes in Côte D'Ivoire. Thus, increasing its demand for technology that cannot be satisfied locally as confirmed by document analysis. Innovation is costly, risky, and path dependent. Hence, it is more efficient for developing countries such as Côte d'Ivoire to acquire foreign technology created in developed countries (Dutta et al., 2020). According to a participant, *“It is worrying to know that the country is mainly dependent on foreign technology for the development and maintenance of the Ivorian SWS.” (P2)*

Reliance on foreign technology could cause, in the short or long term, a dysfunction of the Ivorian SWS. This is a constraint that needs to be considered through this SWS implementation process. Therefore, a delinkage from foreign technology is needed to develop a home-grown technology in line with citizens' ideas, innovations, inventions, and creativities suitable for a technologically sustainable SWS.

□ Tech skills gap

Document analysis and semi-structured interviews with the fourteen stakeholders revealed that a sustainable implementation of the SWS in Côte D'Ivoire will need a pipeline of well-trained IT talent. According to a participant:

“The SWS is new in Côte D’Ivoire therefore; we don’t have well enough trained IT experts in the field. Such that the implementing company has to rely on foreign expertise and even some of our IT experts have been recruited by them, leaving us with a gap to fill.” (P2)

This shows the existence of a tech skills gap in the Ivorian market regarding the issue of SWS implementation. The Tech skills gap describes the difference between individuals' existing skill sets and the skills that the industry needs them to have to perform their job roles effectively.

In PwC’s (2019) 22nd Annual Global CEO Survey, released in January 2019, no less than 79% of global CEOs said they were concerned about the availability of key skills. This figure jumped to 87% among African business leaders, with 45% noting that they were “extremely concerned”.

Based on the foregoing outcome, it is concluded that it is vital for all stakeholders involved in implementing the SWS in the port to invest in building skills, not just for today, but to establish a sustainable pipeline of well-trained IT talent meet future skills needs.

□ Technological unemployment

Technology has always fueled economic growth, improved living standards and opened up avenues to new and better kinds of work (World Bank, 2020). Unfortunately, just as horses were gradually made obsolete as transport by the automobile and as a labourer by the tractor, humans' jobs have also been affected by technology. In other words, technological change can cause technological unemployment, which is seen as structural unemployment. Technological unemployment is the loss of jobs caused by technological change. As confirm by document analysis, this has been a major cause of concern for private stakeholders’ personnel in the case of SWS implementation in the Port of Abidjan. According to the participant:

“Some of the personnel of the port of Abidjan oppose the idea of the SWS because of fear of losing their jobs. For instance, there are actually almost 100 employees typing manually the information related to the manifest into the port IT system. If we start receiving the Manifest directly from the SWS to our IT system, all the 100 employees will lose their jobs or, if lucky be relocated.” (P2)

Technological unemployment is a major cause of concern because, in Côte D’Ivoire, like in most developing countries, public and private companies are overstaffed.

5.3.2 Poor quality service and delivery gap

Document analysis and semi-structured interviews with stakeholders have revealed the fear expressed by the stakeholders for having an implementing company that is not the port authority or the customs as suggested by Wang (2016). According to Joshi (2017) in many SWS projects, poor management is a major challenge. In general, management refers to organising and operating a project, or simply to getting the job done. One of the main challenges is the lack of awareness about information sharing, which impact stakeholder engagement in the project (Jovic et al., 2021). For example, Acheampong et al. (2022) suggested that the implementation team does not always communicate efficiently what they are doing in the early stages of the project.

The participants believe that the implementing company's personnel is not necessarily well trained and experienced enough for some tasks.

“The Customs management team initially did not support the SWS implementation project because we saw our prerogatives being taken away from us through this project. We had some concern about the quality of service that was going to be provided by the implementing company.” (P3)

The implementing company has to perform some services that were initially devoted to other stakeholders, such as the customs. Also, the implementing company does not necessarily have a deep understanding of the working conditions and context of the various stakeholders.

The customs and the port authority have good recruitment and training systems that allow them to recruit the best people and give them the best training possible. Thus, giving them a dedicated agent for a good performance. According to the interviewees, they are not sure that the implementing company can match these standards.

Considering the impact that poor-quality services could have on SWS's stakeholders, the implementing company will have to keep measuring its results and improving their customer service training to guarantee a good service in the short and long term.

5.3.3 Financial sustainability

Without financial sustainability, it could be difficult for the Ivorian SWS to resist the long-term challenges. Considering the country's volatile political situation in recent years, all the stakeholders have shown their concern for the financial sustainability of the Ivorian SWS. Here financial sustainability refers to the ability to maintain financial capacity over time.

The primary source of income of the Ivorian SWS is a flat fee per Custom Declaration charged by the implementing company (GUCE-CI, 2021). This shows the SWS's financing reliance on import and export goods. It means that

“a decrease in the import and export of goods could seriously impact the activities of the SWS in the short or long term.” (P8)

Based on document analysis and semi-structured interviews with stakeholders, it is concluded that to avoid foreseeable financial challenges, the implementing company will need to develop a plan that outlines long-term goals and the resources that will be required to achieve them.

5.3.4 Political instability

Political instability refers to political violence, which leads to violence and civil war. Côte D'Ivoire, since its independence in 1960, had a peaceful political climate, which was interrupted in 1999 when the first coup d'état took place. Since then, the country has gone through different political turmoil, which saw increased anti-government turbulence in recent years. Since 2002, the political crisis in Côte d'Ivoire has had a direct impact on the port throughput and affected imports and exports (PAA, 2022). This has affected its economic development and the implementation of a very important project like the SWS needed to facilitate international trade. Aryee et al. (2021) found that in the case of Ghana, government changes and commitment issues contributed to the delay in implementing SWS in Tema port. It is evident from this that changes in the government can negatively affect the implementation process of the SWS.

Document analysis and interviews with stakeholders have revealed how negatively political instability has influenced the implementation of the Ivorian SWS in the Port of Abidjan.

According to the participant:

“At the beginning of the SWS implementation process, the PAA did not support the SWS project because the PAA was already working on a project to set up a PCS, which was suspended after three years of development.” (P1)

The first SWS implementation project in the port of Abidjan started in 2008. The PAA was the lead agency on that project. But in 2011, the project was canceled by the new Government that came into power following a disputed election that ended in a short civil war (PAA, 2021). Today the PAA believe that if the first SWS project, which started in 2008, was not interrupted, the implementation process would have been very advance.

5.4 Benefits of the SWS

5.4.1 Cost Reduction

The interviews confirmed that the SWS can help reduce traders' compliant costs. The digitalisation of processes and procedures has resulted in reduced delays, improved convenience, and substantial cost savings.

“Our compliance costs associated with transportation/travel, time, administration (e.g., document preparation, photocopying) and telecommunication have been reduced or eliminated.” (P11)

The interview with the stakeholders revealed that the compliance processes became more predictable and transparent.

“For instance, the number of physical movements between agencies by traders was eliminated, and those between banks have reduced a lot.” (P11)

“Most traders and clearing agents have reported a reduction of over 50% in the cost to import.” (P11)

There is also a remarkable reduction or elimination of administrative costs related to storage and retrieval of physical documents with the PAA.

It's also stated in the same interview that cost reduction was effective:

“We are very happy about the implementation of the single window system because it came to reduce the cost of doing business.” (P11)

Based on the interviews, cost reduction has been the greatest satisfaction of the stakeholders, particularly traders (Importer/exporter).

5.4.2 Improved Connectivity and Security

Different public and private stakeholders that issue various permits, such as the Ministry of Commerce, the Ministry of Agriculture, Insurance companies etc., have been connected to the SWS. Business process review undertaken during the implementation offered process simplification, streamlining and harmonisation, documents simplification and alignment.

The SWS offers efficiency and improved document/data security and integrity through single electronic lodging, and seamless data interchange between the organisations. A recent study by Mattei (2020) confirms this, stating that the increased digitalisation in ports is driven not only by efficiency gains, but also by safety and security concerns.

“For example, a sea manifest submitted through the SWS is simultaneously and automatically made available to all stakeholders, including the Customs, for approval. The Ivorian SWS is more secure than the manual process because only authorised staff can access it.” (P11)

An e-forex module has digitalised Exchange Authorization. This module allows the lifting of Exchange Authorizations or Exchange Commitments authorising the payment of import invoices or the domiciliation of export invoices. It has a sub-module to monitor the repatriation of currencies obtained from operators' export sales through commercial banks.

5.4.3 Improved Compliance and Revenue Collection

As stated by Aryee et al. (2021), SWS in ports can improve customs clearance efficiency, increase government revenue, and reduce corruption associated with ports.

According to participants:

“Traders can no longer work outside of the system or find ways around the established payment procedures; the system enables easy detection of non-compliance and makes it easy to crossreference from the system for the level of compliance of traders.” (P11)

Previously when it came to compliance, the stakeholders were involved in an ad hoc manner. The SWS provides a more structured approach to compliance, enabling the stakeholders to discharge their trade facilitation regulatory mandates.

The introduction of the SWS has improved compliance to statutory requirements and ensured a correct revenue yield, which means that traders can no longer avoid the collection of revenue.

Investigating this further, participants concurred and had this to say:

“The SWS has reduced revenue leakage through minimal/elimination of cash transactions at the government agencies.” (P1)

Generally speaking, the responses show that SWS is providing improved compliance and revenue collection.

5.4.4 Improved Collaboration between stakeholders

Apart from improved awareness of mandates and functions of the various public and private stakeholders, the SWS has also catalysed and enhanced the collaboration and coordination

between various public and private stakeholders, especially those that are interdependent in the issuance of trade documents (Putzger, 2020).

Interviews with all stakeholders have revealed that collaboration among stakeholders is still a challenge, but it is a greater improvement than it was prior to the SWS. In other words, the SWS has enabled greater collaboration among stakeholders. According to the participants: *The collaboration has helped promote knowledge sharing among all the stakeholders. (P6)* Improved collaboration between stakeholders is crucial for improving international trade.

5.4.5 Electronic storage of extensive data

As suggested by Kapkaeva et al. (2021), the SWS allows large amounts of data generated by stakeholders to be collected, processed, and stored easily. From the interviews, it appears that the SWS brought much positive change in terms of data storage.

According to participants:

“In the past, the storage of data (physical files/records) was difficult for government agencies.” (P8)

“Previously, it was difficult for government agencies to retrieve data efficiently, analyse and report it.” (P1)

The SWS has offered a secure, accurate and efficient data repository and reporting capabilities leading to real-time data updates among the public and private stakeholders. The SWS has allowed the stakeholders to generate reports with ease for prompt decision-making (...).

In this respect, a participant highlighted that:

“The SWS has enabled the country to have, on a real-time basis, a single source of data and trade facilitation statistics.” (P8)

5.4.6 Enhanced Efficiency and Consistency

The SWS is an effective, real-time, fast, flexible, and complex information system that can improve efficiency at all stages of the cargo process during unloading and loading, customs clearance, and delivery inside and outside the terminal (Caldeirinha et al.2020). Traders and their trade facilitation agents have observed improved efficiencies in their operations. Thus, it takes less time and costs to obtain permits, approvals, and other documents.

“The management team at the bank readily adhered to the SWS project and facilitated its adoption within it. The SWS brought celerity and efficiency in our work.” (P13)

“Also, the fact that the majority of the stakeholders are integrated to the system, it facilitates the obtention of the information in a timely manner, which allows operational efficiency.” (P11)

For public stakeholders like customs, this efficiency results in less fraud:

It has now become possible for us to view permits approved by the other Government Agencies online through the system. It is really good for us because it eliminates or reduces document falsification. (P3)

Interviews with stakeholders have revealed that the permits are available in real-time as soon as they are approved. The SWS has improved communication and sharing of documents between public and private stakeholders and government agencies; For instance, the freight forwarder is able to access on the SWS platform all the permits and licences issued by the Ministry of Commerce to their clients (Importers/Exporters).

“This has entirely removed the need for the traders (Importers/Exporters) going from office to office, a requirement that existed before the advent of the SWS.” (P10)

In addition,

“Most of the movement between public stakeholders for physical transfer of documents was eliminated through automation and business process re-engineering.” (P8)

Through the interviews, it was also confirmed that the SWS helps improve risk management by the customs. According to participants:

“It became easy for the Customs to target and release cargo using the Risk Management Module in the SWS.” (P3)

The SWS makes it possible for the Customs to profile cargo based on various criteria such as place of origin, nature of cargo, history of the importer/exporter, etc. This makes it easy to target specific individuals/cargoes without inconveniencing others. Based on the preceding outcome, it is concluded that the Ivorian SWS allowed the public and private stakeholders to reorganise their operations and structure to focus more on other value-adding tasks. It allowed them to free up their workforce from repetitive actions that did not need that much human intervention.

5.4.7 Improved Accountability and Transparency

The SWS has reduced, and in some cases eliminated, human interaction between officers in government trade facilitation agencies and the private sector. Traders and other stakeholders receive system notifications on the application approval progress, making it easy to keep track. The ability to track the time taken to process documents by the stakeholders across multiple steps and government agencies has also had a positive impact on the accountability and response rates of the government agencies and a reduction in opportunities for rent-seeking (Kapidani et al. 2021).

“The SWS has made it more secure to facilitate trade since government officers no longer need to handle a lot of money.” (P3)

5.5 Key stakeholders and development stage of the Ivorian SWS

Port community members include port facility and infrastructure providers, cargo handling service providers, shipping operators and agents, land transport operators, and cargo representatives (Jovic et al, 2021). Port activity traditionally involves several private and public organizations that operate fragmentedly (Caldeirinha et al., 2022). Interviews with various stakeholders revealed that the Ivorian SWS is inspired by the UN guidelines, which decompose the implementation of the SWS into five stages, as can be seen in section 2.7.2. The UNECE (2013) SWS implementation road-map specifies that a single paperless window for customs should be implemented at the initial stage ASYCUDA world, which is the IT system of the Ivorian Customs, is partially automated since physical documents are still required in the clearance process, as can be seen in section 4.5.3.

At this stage, the implementing company collaborated with the Government body aligned to tax collection on goods coming into and leaving Côte D’Ivoire (Org 3) to digitalise the first modules (RFCV, etc.) for pre-clearance of goods. The implementing company took over several (Org 3) functions in order for them to be digitalised and operated, which was problematic for (Org 3).

“In addition, we did not like the fact that the development of certain customs modules (RFCV, EDAU, etc.) be entrusted to an external structure. (Org 3) saw in this its prerogatives being withdrawn, and high risk of its data being misused.” (P3)

It is important to note that, at the initial stage, (Org 3) is the primary stakeholder involved in dematerialisation.

In the second stage of the UNECE (2013) SWS road-map, connections will need to be made with Government Back-end IT systems, such as E-Permit Exchanges and Paperless Customs Systems. At this stage, the key actors involved, which are part of this study, are the Government body aligned to maritime affairs (Org 5), Government body aligned to trade (Org 6) and Government body aligned to Agriculture (Org 7). In Côte D'Ivoire, the goal at the second stage is partially achieved, as can be seen in section 4.5.3.

The third stage of the road-map requires e-documents exchange among stakeholders within the (air, sea, dry) port community. In Côte D'Ivoire, this stage is partially achieved with a PCS being put in place with modules such as E-manifest, E-voyage, and E-movement. The key stakeholders involved at this stage are the PAA, Shipping companies, Stevedores, and Insurance companies.

The stakeholders involved at this stage, which are part of this study, are: Importers and Exporters, Commercial banks, Clearing & Forwarding Agents. Interviews with stakeholders have revealed that although the implementing company has started the dematerialisation at this stage, there is still a lot to do. This stage, which has to do with post-clearance of goods from the port, is still mainly manual.

Finally, at the fifth stage, the UNECE (2013) road-map requires a cross-border paperless trade or a regional information system at an experimental stage. According to the participant, the Ivorian SWS and the Senegalese SWS have experimented with the paperless transmission of the certificate of origin for over a year since 2004. Unfortunately, the experiment could not carry on for legal and technical reasons. In fact, up till now, the law allowing the use of electronic documents and signatures have not been passed yet in Côte D'Ivoire. This represents

a serious obstacle for implementing a regional Single window system knowing very well that electronic documents and signatures are required at this stage.

“As an implementing company, today...I can say hum just more than 50% of our goals are achieved. Many modules are operational, some are not, and some modules are yet to be conceived. We have made a lot of progress, but we have not achieved yet the stage of a full paperless SWS intended.” (P8)

In fact, according to the participants, the dematerialisation of all pre-clearance processes is completed. But when it comes to the clearance and post-clearance of goods, although a lot has been already done, there is still more to be done to achieve a paperless system. An illustration of how the Ivorian SWS compared with the UNECE (2013) road-map is given in Figure 4.1 based on data collected from documents provided by the implementing company.

For this research, fourteen participants from fourteen different public and private organisations were interviewed (Appendix 6). As can be seen in Appendix 6, these stakeholders play various roles in implementing the SWS in the port of Abidjan. The range of stakeholders involved in the implementation of the SWS in the port consists of private companies on the one hand (shipping agents, Stevedore companies, Clearing agents, Insurance companies, etc.) and public or government agencies – Government body aligned to tax collection on goods coming into and leaving Côte D’Ivoire and Port Authorities, for example – on the other hand. However, the interviews with stakeholders revealed two stakeholders as the key players in the implementation process of the SWS in the port of Abidjan. According to the participant:

The implementation of the SWS in the port of Abidjan is mostly influenced by two actors hum, the Government body aligned to tax collection on goods coming into and leaving Côte D’Ivoire (Org 3), and the PAA. Org 3 as a State public service are responsible for implementing and

enforcing the regulatory provisions to which the movements of people, goods, means of transport and capital are subject. The PAA plays a key role in coordinating the activities of all stakeholders in the port community system.

“The frank collaboration between Org 3 and the PAA is a prerequisite in establishing an effective Single Window System because the removal of goods must pass through green lights given by Org 3.” (P8)

PAA holds an important role as initiator and creator of the port development strategy and coordination of the entire Port Community. As the PAA is responsible for the seaport’s safe, sustainable, and competitive development, it may represent the most important factor in SWS implementation. Through the SWS, PAA can develop into real digital hubs and neutral data managers at the transport and logistic chain service. By gathering and exchanging real-time information among different parties in the process, logistics processes can be optimised, and transport infrastructure can be used more efficiently. Regarding the client structure, shipping lines and freight forwarders play the most important role, followed by importers and exporters in general and shipping agents.

Conclusion

This chapter has made it possible to understand in more depth how the critical factors have impacted the different organizations through the 19 identified codes, which are linked to the ten critical factors. It should also be noted the identification through this chapter of a new critical factor “Political instability” following the thematic analysis of participants' answers and document analysis. As discussed in chapter 5, SWS implementation within a port is mainly driven by two stakeholders, Customs, and the port authority. It is the duty of the customs to implement and enforce the regulations that govern the movement of people, goods and means of transport and the capital within the State. As a major player in the port community system, the port authority coordinates the activities of all stakeholders. The next chapter discusses the differences in perception by stakeholders of critical factors during the different implementation stages and the factors key to SWS implementation.

Chapter Six Critical factors assessment and revisiting the proposed framework

6.1 Introduction

This chapter provides an overview of the criticality of the ten (10) critical factors that influences the SWS implementation using a similarity congruence matrix generated from both the analysis of internal and external documents and respondents' perceptions from the semi-structured interviews ; and this is not without precedence (Langley, 1999 ; Smith, Grimm, and Gannon, 1992 ; Van de Ven and Poole, 1990 ; Nkrumah et al., 2018). The chapter begins by providing a definition of what criticality is and provides the different categories of criticality for the implementation process of the SWS. Subsequently, it provides a discussion of the evaluation of the criticality of each of the critical factors at every implementation as well as an overall evaluation of the critical factors across the five-implementation stages. Finally, it concludes with a revision of the proposed framework based on the insights from the data.

6.2 Evaluation of the critical factors

This research posits criticality as the current or potential impact a critical factor can have on the implementation process of the SWS (Hayes, 2017). Likewise, impact is defined as effects or consequences of the critical factors on the SWS implementation process. Following an adaptation of the quantification strategy as a sense making tool for both revealing and assessing the criticality of certain patterns in the SWS implementation process (Langley, 1999), the research developed a similarity congruence framework matrix for assessing and ranking the criticality of factors. The extant research provides justification for using this technique with studies that have some form of process data in order to enable them systematically list and code qualitative incidents occurring within the data according to some predetermined characteristics

(Langley, 1999; Smith, Grimm, and Gannon, 1992). The result of the systematic listing and coding is that there is a gradual reduction of the complex mass of information to a set of quantitative time series that can be analysed using either statistical methods or qualitative inferences (Langley, 1999). Process theory advocates further argue that once the original data are complete and the resultant coding of incidents is reliable, descriptive patterns in the sequence of events can be systematically verified for congruence. For the purpose of this research, descriptive patterns of similarity in the criticality of factors were sought from both the document analysis and respondents perception of the data. This resulted in the construction of a similarity congruence matrix with the critical factors on the horizontal axis and the stages of implementation coupled with the designated implementation organisation on the vertical axis. Since ‘process theories are founded on the idea that there are fundamental similarities in the patterns of event sequences across cases’ (Langley, 1999 ; pg 697), this research focused on the emerging and common negative impacts of the critical factors that were revealed across the documents and interviews. The different implementation partners thereby highlight that there is value in the sub-factors, challenges and risks identified in Chapter 5 since they relate to the critical factors and describe how the critical factors adversely affect the SWS. As part of the interview process, the respondents provided information about the time frame for executing SWS in their respective departments. Hence, it was possible to determine which organisations were tardy in implementing the SWS and which ones were not. As shown in Table 6.1, the SWS implementation has been delayed in eight (8) organisations.

Table 6-1 Level of dematerialisation process

Number of stakeholders with a process fully paperless	Number of stakeholders with manual or partially paperless process
4	8

As mentioned in chapter 5, these delays are directly related to the challenges and risks faced by the stakeholders, which makes the challenges, risks, and time of execution the perfect tool of assessment of the impact of the ten (10) critical factors identified.

Each critical factor at the different phases of the SWS implementation was evaluated according to the impact on each stakeholder using qualitative data. A second level of evaluation, which consisted of evaluating the criticality of the ten (10) factors at every implementation stage of the SWS for each stakeholder interviewed was conducted. This was implemented using an inductive coding approach compatible with Saunders et al. (2016)'s thematic analysis of inductive approaches. The coding was used to develop three categorisations of criticality namely high, medium and low. The codes were created during the inductive thematic analysis of the data collected through semi-structure interviews (Urquhart, 2013). The codes were created to answer to the question of the impact of the critical factors on the implementation process of the SWS (Appendix 5). According to Saldaña (2015) coding is a way to ensure that the questions asked are the questions that have been answered. The preceding sub-sections define the three categories.

6.2.1 First category: High

The first category “high” implies that the factor required immediate action in the short term, due to its profound impact. In other words, the critical factor caused the SWS implementation process to stagnate or be interrupted in the short term.

The critical factor "Lack of top management support" can be cited as an example in this category. According to the research, this critical factor halted the SWS implementation in some organisations, such as PAA, because of the refusal of their manager to cooperate with the implementing company at the beginning of the project. To unblock the situation and continue the implementation, the implementing company, supported by the government, had to negotiate with the PAA's top management leading to the implementation of the first module in the port after six years of the launch of the project. As a result, the impact of this critical factor can be considered "High" for some stakeholders, as confirmed by participants P1 and P2:

“The lack of top management support was very critical for the main stakeholders (The PAA, Government body aligned to tax collection on goods coming into and leaving Côte D’Ivoire (Org3)) since these stakeholders already had their IT systems that they were developing to digitise their import-export procedures. Therefore, stakeholders saw the integration into the GUCE-CI platform as a process that would lead them to abandon their digitalisation project.”
(P1)

"The e-manifest module, which is an essential element of a PCS, was implemented in 2020, six years after the start of the project". (P2)

6.2.2 Second category: Medium

The second category, “medium” means that the factor does not require an immediate action in the short term. In other words, the factor did not hamper the project’s development in the short term. Rather, an action will be needed within a reasonable foreseeable period to prevent the stagnation of the process.

This category can be illustrated by the critical factor "Inadequate legal framework". Although the government made great efforts, the regulations in place were insufficient for implementing a 100% paperless SWS at the start of the project. Despite the inadequate legal framework, the project started in hopes that the government would pass the final laws governing electronic signatures within a reasonable time-period in order to fully dematerialize.

However, these laws are not yet in force, so certain organizations such as customs are blocked from fully dematerializing their system. This explains why the criticality of this factor is considered as medium and this was confirmed by a respondent who said this:

“a strong political will to ensure that all the laws necessary for the implementation of a 100% paperless system emerge, that they are promulgated and effectively enforced by the various stakeholders.” (P 8)

6.2.3 Third category: Low

The third category, “low” means that the critical factor did not require a short-term action and did not have a short-term impact on the implementation process. However, if nothing is done at a later stage, it could delay or interrupt the implementation of the project.

This category can be illustrated by the critical factor "Lack of financial resources". Due to the PPP business model chosen for the project, the financial resource required for the

implementation of the SWS in the port of Abidjan did not pose a problem particularly for the public stakeholders. Due to the SWS's dependence on import and export of goods, and the country's volatile political situation, all stakeholders are concerned about its financial sustainability. It was confirmed by a respondent (P2) saying this:

“...the other factor that we consider as a risk is the sustainability of the system that is not guaranteed.” (P2)

Based on the preceding outcome, it is concluded that to avoid the foreseeable financial challenges, the government will need to develop a plan that outlines long-term goals and the resources that will be required to achieve them.

This is a justification of why this critical factor is considered “low”, because of the long-term aspect of its impact. Following the evaluation of the critical factors, the following result was obtained as can be seen in Table 6.2

Table 6-2 Evaluation of the critical factors per implementation stage and per stakeholder

Evaluation of the critical factors per implementation stage and per stakeholder													
	Stage 1	Stage 2				Stage 3				Stage 4			Stage 5
Stakeholders	Org 3	Org 6	Org 7	Org 5	Org 4	PAA	Shipping agent	Insurance company	Stevedore	Importer/exporter	Bank	Clearing agent	Org 8
Inadequate ICT Infrastructure	M	M	M	L	L	H	M	L	L	H	L	H	H
Political instability	M	L	M	M	M	M	M	M	L	H	L	M	M
Lack of Top management support	H	L	M	L	H	H	L	L	L	L	L	L	L
Lack of Financial resources	L	L	L	L	L	L	L	L	L	M	L	M	L
Inadequate Legal framework	H	M	M	L	L	M	H	L	L	H	L	H	H
Lead agency's lack of clarity and inclusion	L	L	M	L	L	M	L	L	L	M	L	M	M
Resistance to change from personnel	H	L	L	L	L	M	M	L	L	M	L	H	M

Lack of Partnership and collaboration among stakeholders.	M	L	M	L	M	M	L	L	L	M	L	M	H
Fear of security and privacy	L	L	M	L	L	H	M	L	L	M	M	M	M
Lack of strong political will	H	M	M	L	L	M	H	L	L	H	L	H	H

Note: H means a high, M means medium and L means low

6.3 Discussion of critical factors' evaluation at every implementation stage.

In section 2.3.4, the SWS is implemented in five stages as suggested by UNECE (2013). Also, at each stage of implementation, the stakeholders involved are mentioned. Based on the UNECE (2013) suggestions, the research distributed the different stakeholders (Appendix 6) according to the stage at which they intervened. Thus, in this section, the discussions will concern each stage of implementation with the corresponding stakeholders.

6.3.1 Stage 1 of the SWS implementation

In the initial phase of the implementation of SWS, only one key stakeholder is concerned: (Org 3), which is the government body aligned to tax collection on goods coming into and leaving Côte D'Ivoire. Various critical factors identified in this study impacted the SWS implementation process at stage one (1) to varying extents. As shown in Table 6.2, the critical factors have been categorised into three main categories: Low (L), Medium (M), and High (H).

Under the category Low, three critical factors are identified, Fear of security & privacy, Lead agency's lack of clarity and inclusion, and Lack of financial resources. This means these factors have the most negligible adverse impact on the implementation of SWS. In other words, these factors do not have a short-term negative influence that requires action right away. This indicates that these factors did not cause a halt or slowdown in the implementation of SWS for Org 3. For example, financial resources were in the low category for Org 3 because, as a participant said:

“This factor has not been critical because the implementing company is providing free training sessions.” (P3)

Among the critical factors in the medium category, three critical factors are identified:

Inadequate ICT Infrastructure, Lack of Partnership & Collaboration among Stakeholders, and Political instability. The critical factors in this category influenced the implementation of the SWS more than those in the Low category. These critical factors required short-term actions to facilitate SWS implementation. In the short-term, it was necessary, for example, for Org 3 to be equipped with adequate IT equipment and to train its staff with regards to the ICT Infrastructure factor. This was confirmed by a participant saying:

“The implementing company provided ICT equipment, and internet free of charge to public stakeholders involved in the project to facilitate a quick start of the project.” (P1)

Finally, the critical factor “Lack of partnership & collaboration among stakeholders” caused a slowdown in the process due to inadequate cooperation from Customs. For the implementation process to proceed smoothly, action at the government level was needed.

In the High category, Table 6.3 specifically highlights factors scoring "high", meaning they are key to SWS implementation at stage 1. The four (4) critical factors highlighted at stage 1 are: Lack of Top management support, Lack of strong political will, Resistance to change from personnel, and Inadequate Legal framework. These critical factors had an immediate negative impact on the SWS implementation process. Indeed, these critical factors made the process stagnate in the short term. For example, there was resistance from top management and the personnel of (Org 3). In response to this situation, a participant confirmed that:

“Some top managers of the IT department of (Org 3) were removed from their positions by the government” (P1).

Lastly, a participant said:

“The Inadequate Legal Framework factor requires that DECREE 127 / MCAPPME / MPMB of March 21, 2014, be enacted in order to provide (Org 3) authorities with a minimum legal foundation from which to implement the SWS” (P1).

This decree determines the conditions for entry into Côte D’Ivoire of foreign goods of any origin and any provenance and the requirements for the export and re-export of goods to foreign destinations. Because of the four (4) factors in the High category, if no solution had been found in the short term to mitigate their impact, the SWS implementation process would not have advanced.

Table 6-3 Criticality assessment at stage 1 for stakeholder P3

CRITICAL FACTORS		STAKEHOLDERS /Interviewees/Stage 1
		P3
1	Inadequate ICT Infrastructure	
2	Lack of Top management support	*
3	Resistance to change from personnel	*
4	Lack of financial resources	
5	Lack of strong political will	*
6	Inadequate legal Framework	*
7	Lead agency's lack of clarity and inclusion	
8	Lack of partnership & collaboration among stakeholders	
9	Fear of security and privacy	
10	Political instability	

Note: * denotes an agreement to the criticality (High) of a factor.

6.3.2 Stage 2 of the SWS implementation

The second stage of implementation concerns four public stakeholders, including (Org 6), (Org 7), (Org 5), and (Org 4). The result of this study in Table 6.2 and Table 6.4 (specifically highlights factors scoring "high", meaning they are key to SWS implementation at stage 2), reveals that the impact of the ten (10) critical factors identified mainly concerns Low and Medium categories for three (3) stakeholders. However, the factor “Lack of Top management support” has reached the High category for the stakeholder (Org 4). At stage 2, stakeholder perceptions indicate that there was no delay caused for three public stakeholders (Org 5) (Org 6) and (Org 7). This result is explained by the fact that these stakeholders, as public stakeholders, have enjoyed the same state benefits (GUCE-CI, 2021). For example, according to the participants to implement the SWS, all public stakeholders received free ICT equipment, including free internet services.

A participant confirmed this by saying:

“Here again, all we needed in terms of ICT infrastructure and software was provided by the implementing company”. P7

Furthermore, there is the fact that the state has a higher level of control over these public stakeholders, which enables it to influence their decision-making. As for the case of the stakeholder (Org 4) in which the factor “Lack of Top management support” has reached the High category, this has primarily to do with the fact that (Org 4) has greater autonomy despite being partly state-owned. In addition, (Org 4) had already begun a process of digitalisation, which it didn't want to abandon to join the SWS. A participant confirmed this by saying:

“The management team was very reluctant to join the SWS project for various reasons. First of all, we already had an IT system that we did not want to abandon.” P4

Consequently, its leadership has opposed the SWS, which caused considerable delays in the SWS implementation process. The “High” category of the factor “Lack of Top management support” for the stakeholder (Org 4) is thus justified. The results of this study support the progress made at stage 2 of the SWS implementation, as indicated in Section 4.9.2 (Table 4.7). It can be concluded that despite the challenges associated with the ten (10) critical factors identified, substantial progress has been made at stage 2 of the SWS implementation. The main reason for this is that nine of the ten factors have a criticality level that is either low or medium.

Table 6-4 Criticality assessment at stage 2 for stakeholder P4, P5, P6, P7

CRITICAL FACTORS		Stakeholders Stage 2			
		P4	P5	P6	P7
1	Inadequate ICT Infrastructure				
2	Lack of Top management support	*			
3	Resistance to change from personnel				
4	Lack of financial resources				
5	Lack of strong political will				
6	Inadequate legal Framework				
7	Lead agency's lack of clarity and inclusion				
8	Lack of partnership & collaboration among stakeholders				
9	Fear of security and privacy				
10	Political instability				

*Note: * denotes an agreement to the criticality (High) of a factor*

6.3.3 Stage 3 of the SWS implementation

An analysis of the criticality of the factors is carried out at stage three (3). It involves comparing four (4) stakeholders: PAA, Shipping Agent, Insurance company, and Stevedore company.

These four (4) stakeholders are those concerned with the implementation of the SWS at this stage, based on the UNECE (2013) SWS road-map framework. According to the results of this

study, the ten (10) critical factors identified fall into three (3) categories of criticality (Low, Medium, & High), as can be seen in Table 6.2. In addition, Table 6.5 specifically highlights factors scoring "high", meaning they are key to SWS implementation at stage 3.

The criticality of the factors is primarily found within the Low and Medium categories for the four stakeholders. Two stakeholders (PAA, Shipping agent) have five critical factors combined that fall into the High category: Inadequate ICT infrastructure; Political instability; Lack of strong government will; Fear of security and privacy; and inadequate legal framework. Due to incompatibility issues with the SWS software and its IT system, the PAA scored high on the factor "Inadequate ICT infrastructure". Until now, this problem has existed. A participant confirms this by saying:

"The complexity to use the SWS platform came from the fact that the PAA IT system software was incompatible with the software used for the SWS." P2

"After seven years of implementation, the port IT system is still not directly connected to the SWS platform." P2

Furthermore, the PAA did not want the SWS for fear of exposing their data to hackers, who might sell it to competitors, which justifies the High category of the factor "Fear of security and privacy". The factor "Lack of Top management support" reached a high category for the PAA because the top management was reluctant to implement SWS at the beginning. Through its resistance, the PAA expressed its dissatisfaction with having had its own project to set up a SWS suspended. Additionally, the PAA attributed its resistance to the lack of understanding it had with the implementing company regarding the objectives of dematerialisation for the digitalisation of processes.

Regarding shipping agents, the results of this study show that the factors “Lack of strong political will” and “Inadequate legal framework” are among the most critical factors. The reasons for this is stakeholders’ perception shows that shipping agents feel frustrated because the SWS implementation in the port is very sluggish due to the lack of strong political will from the authorities to force some stakeholders to completely dematerialise their systems and the absence of laws authorising electronic documents and signatures (GUCE-CI, 2021).

This reality requires the shipping agent to use both manual and electronic working methods. Peterson (2017) confirms this, stating that national single windows coexist alongside paperbased systems in West African countries, diminishing the savings that can be achieved under the former system. The results of this study show that the SWS in the port of Abidjan at stage 3 is not yet entirely paperless, as shown in section 4.9.2 (Table 4.7). It should be noted that today the negative impact of factors such as “Inadequate ICT Infrastructure”, “Lack of strong political will” and “Inadequate legal framework” represent the main obstacles to a total dematerialisation of the SWS at this stage of the project.

Factors that only hit the Low and Medium categories do not represent an obstacle to the project’s progress today. These factors are in the Low and Medium categories to show that their influence did not cause project stalling or slowdown among various stakeholders at stage 3. The results show that of among the four (4) stakeholders at stage 3, the PAA and shipping agents are the most affected by factors during the implementation of the SWS in their department. As shown in Table 6.2, insurance companies and stevedore companies were less influenced by factors while implementing the SWS in their department. This study revealed that insurance companies have fully dematerialised their working processes. Stevedores were not affected by the factors since they are connected to the SWS platform through web services

only to receive information related to cargo handling operations. The modules dedicated to the activity of Stevedore companies are not yet operational at the time of this study.

Table 6-5 Criticality assessment at stage 3 for stakeholder P2, P9, P14, P12

CRITICAL FACTORS		STAKEHOLDERS /Interviewees/Stage 3			
		P2/PAA	P9/Shipping agent	P14/insurance company	P12/stevedore
1	Inadequate ICT Infrastructure	*			
2	Lack of Top management support	*			
3	Resistance to change from personnel				
4	Lack of financial resources				
5	Lack of strong political will		*		
6	Inadequate legal Framework		*		
7	Lead agency's lack of clarity and inclusion				
8	Lack of partnership & collaboration among stakeholders				
9	Fear of security and privacy				
10	Political instability				

Note: * denotes an agreement to the criticality (High) of a factor.

6.3.4 Stage 4 of the SWS implementation

At stage four (4), an analysis of the criticality of the factors influencing the implementation of SWS in the port of Abidjan will compare three (3) stakeholder groups, namely: Importers and Exporters, Clearing and forwarding agents, and Commercial Banks. According to UNECE (2013), the implementation of the SWS at stage four (4) concerns these three (3) stakeholders. The results of this study reveal that out of the ten (10) critical factors that influence the implementation of the SWS in the port of Abidjan, five (5) critical factors have reached a level of criticality, which places them in the High category. Of these five (5) critical factors, four (4)

influence importers & exporters: Inadequate ICT Infrastructure, Political instability, Lack of strong political will and Inadequate legal framework. Because these critical factors cause severe delays and stagnation in the implementation of the SWS, they fall into the high category as seen in Table 6.6, which specifically highlights factors scoring "high", meaning they are key to SWS implementation at stage 4. Indeed, this study revealed that importers and exporters are not technologically ready for a total dematerialisation of all import-export procedures.

The participant confirms this by saying that:

“We have challenges using it because the majority of us (Importer / Exporters) are not computer literate, and we are not e-ready.” (P11)

As this study revealed, exporters and importers usually do not possess adequate computer skills to connect and use the SWS. Additionally, they face unstable internet connections and a high cost of ICT equipment. A participant highlighted that:

“For instance, new computers had to be bought and installation to be made to have the internet connection. And hum you know hum the computers, software and other related gadgets are not always cheap” (P11)

Political instability ends up in the high category for importers & exporters due to its profound impact, which could lead to the permanent closure of their businesses.

The factors “Lack of strong political will” and “Inadequate legal framework” are found in the high category for importers/exporters because they see their efforts to introduce a totally dematerialised process frustrated by a lack of strong government political will. According to the participant:

“The lead agency and the government are not taking strong measures to compel some public stakeholders to comply fully with the principles of the SWS.” (P11)

Due to these factors, importers and exporters use both manual and electronic methods to import and export goods. Sometimes this wastes more time and money when the SWS is supposed to save them time and money.

Concerning the clearing and forwarding agent, there are four (4) critical factors of the high category, those are the following: “Inadequate ICT Infrastructure”, “Political instability”, “Lack of strong political will” and “Inadequate Legal Framework”. This study shows that these factors affect both importer/exporter and freight forwarders in the same manner. For example, an interview with the participant revealed that:

“It will take a strong political will to ensure that all the laws necessary for the implementation of a 100% paperless system emerge, that they are promulgated and effectively implemented by the various stakeholders.” (P10)

According to the results of this study, the only factor in the High category that clearing & forwarding agents do not have in common with importers/exporters is “Resistance to change from personnel”. The reason for this is that the staff of the clearing & forwarding agents have consistently voiced their dissatisfaction with the SWS, which contributed to delaying its implementation in their department. According to the interviewees,

“Freight forwarders personnel resisted vividly the implementation of the SWS for various reasons in the early days.” (P10)

“When it comes to processing formalities with the customs, it is easier to use the Customs IT system (ASYCUDA) than the SWS.” (P10)

According to the findings of this study, the stage 4 implementation of the SWS is not efficient for importers and exporters and clearing and forwarding agents. In other words, at stage 4, the SWS is not yet entirely paperless for both clearing and forward agents and importers/exporters. Indeed, as can be seen in Table 4.7 of section 4.9.2, several modules dedicated to their activity are not yet developed or are developed but not yet operational.

At stage four (4) of the SWS implementation, all the factors that impact the third stakeholder (Commercial bank) are rated low in criticality. The reason for this is that the implementation of the SWS in the commercial banks has not slowed down or been stopped because of any difficulties encountered. As of today, the banking process for import and export of goods has completely been dematerialised, according to this study.

Based on the results of this analysis, it can be concluded that the SWS implementation at stage four is not yet fully paperless mainly because of the following four factors: Inadequate ICT Infrastructure, Lack of strong political will and Inadequate legal Framework.

Table 6-6 Criticality assessment at stage 4 for stakeholder P10, P11, P13

CRITICAL FACTORS		STAKEHOLDERS /Interviewees/Stage 4		
		P10/clearing forwarding agent	P11/importer exporter	P13/commercial bank
1	Inadequate ICT Infrastructure	*	*	
2	Lack of Top management support			
3	Resistance to change from personnel	*		
4	Lack of financial resources			
5	Lack of strong political will	*	*	
6	Inadequate legal Framework	*	*	
7	Lead agency's lack of clarity and inclusion			
8	Lack of partnership & collaboration among stakeholders			
9	Fear of security and privacy			
10	Political instability		*	

Note: * denotes an agreement to the criticality (High) of a factor.

6.3.5 Stage 5 of the SWS implementation

A key objective at stage five (5) of the SWS implementation is to analyse the effects of the ten (10) identified critical factors on the activity of the implementation company to achieve its goals. Stage five (5) involves the implementing company interconnecting the SWS of Côte d'Ivoire with other SWS in West African countries. The results of this study shown in Table 6.7 indicate that seven of the ten (10) critical factors identified have a high degree of criticality: Inadequate ICT Infrastructure; Political instability; Lack of Top management support; Lead agency's lack of clarity and inclusion; Lack of strong political will; Lack of Partnership and collaboration among stakeholders; Inadequate Legal Framework. The remaining three fall into

the medium category: Fear of security and privacy, Lack of financial resources; and Resistance to change from personnel.

Table 6.7, specifically highlights factors scoring "high", meaning they are key to SWS implementation at stage 5. The number of factors in the High category confirms that the implementation of the SWS at stage five has encountered and continues to encounter enormous difficulties. A participant confirmed this by saying:

“Hum... you see at this level, which represents the regionalisation of the SWS, we had an experiment trying to connect the Ivorian SWS with the Senegalese SWS through an exchange of certificate of origin for goods. But hum.... within a year, the project was stopped because of the lack of law authorising electronic document and signature in Côte D’Ivoire.” P8

The SWS of Côte D’Ivoire experiences negative influence at stage five, as several factors impact the regionalisation of the system. The factors “Lack of strong political will” and “Inadequate legal framework”, for example, contribute to the situation since, at present, according to the participants, the laws authorising the use of electronic signatures and documents have not yet been adopted. As a result, of this obstacle, the SWS implementation at stage 5 has not been possible, which explains why the electronic certificate of origin project between Côte D’Ivoire, and Senegal was stopped. An electronic certificate of origin requires a digital signature, which unfortunately is not yet implemented in CI. Moreover, participants describe the absence of the strong political will of the government as follows:

“Hum apart from the fact that to achieve a fully paperless SWS, strong political will is needed, which I believe the lead agency can help achieve at the national and regional level.” P8

The factor “Inadequate ICT Infrastructure” is characterised by some challenges that hinder the implementation of the SWS at stage 5 such as unstable internet, a lack of computer literacy, and software incompatibility.

According to Peterson (2017), African countries in sub-Saharan Africa lack sufficient and fast internet access for their local businesses. In addition, the illiteracy in computer science is another challenge for many private companies in Africa. The factors “Political instability” and “Lack of Top management support” with a high criticality level also constitute barriers to implementing SWS at stage 5. For example, “Political instability” largely contributes to this stagnation of the project. Because according to Hammed (2018), in Africa, new authorities do not always follow the same plans their predecessors did, whether they come to power through arms or peacefully.

Regarding the factor “Lack of Top management support”, it emerges from this study that most of the top managers of stakeholders have not yet accepted the idea of data exchange at the regional level. This affects the collaboration of stakeholders at the regional level. Considering this, the Partnership and Collaboration factor is rated "High" in terms of criticality, showing how important the collaboration among stakeholders is for an effective implementation of a SWS as suggested by Tijan et al. (2019). For example, this study revealed misunderstandings between the SWS of Côte D'Ivoire and the SWS of Senegal on the format of the electronic certificate of origin to be adopted. A participant confirms this by saying:

“At the regional level, despite the willingness of the countries to interconnect their SWS, there are still several points of disagreement. Hmm ... for example, Côte D'Ivoire and Senegal could not agree on the format of the certificate of origin.” P8

The study revealed that the three remaining factors (Fear of Security and privacy, Resistance to change from personnel and lack of financial resources), which are of medium criticality, are not likely to affect the project at stage 5 significantly. In the light of this analysis, it can be concluded that the attempt to implement the SWS at stage 5 has failed and that no modules are operating at this stage currently.

Table 6-7 Criticality assessment at stage 5 for stakeholder P8.

CRITICAL FACTORS		STAKEHOLDERS /Interviewees/ Stage 5
		P8/GUCE-CI
1	Inadequate ICT Infrastructure	*
2	Lack of Top management support	
3	Resistance to change from personnel	
4	Lack of financial resources	
5	Lack of strong political will	*
6	Inadequate legal Framework	*
7	Lead agency's lack of clarity and inclusion	
8	Lack of partnership & collaboration among stakeholders	*
9	Fear of security and privacy	*
10	Political instability	

Note: * denotes an agreement to the criticality (High) of a factor.

6.4 Discussion and congruence of stakeholders' perception of factors key to SWS implementation.

The purpose of this sub-section is to enable the research to prioritize the critical factors deemed important for SWS implementation in cognizant of the fact that not all the modules of SWS have been fully implemented. A section of the interview protocol required respondents to reflect on which critical factors they deemed important or significant for the implementation of the SWS. By prioritizing the critical factors, the aim was to bring to the fore, essential baseline factors necessary for implementing an SWS. Although the prioritization of factors is

based on the recommendations of a small sample size, the research contends that the sample are information rich respondents who are fully involved in the implementation of SWS in the port of Abidjan. Even so, it was envisaged that this will provide insights for practitioners seeking to deepen SWS implementation within the ports of developing countries.

The research contends that prioritizing the critical factors is a call for the fit of congruence of perceptions of critical factors that significantly hamper the full implementation of the SWS, and this is not without precedence (see Blankson et al., 2018; Nkrumah et al., 2016). Congruence theory was initially developed for the study of political, sociological and government structures (Eckstein, 1966). However, over the years it has been applied in strategic marketing, specifically in deliberating the positioning strategies of firms (Nkrumah et al., 2016). For instance, Blankson et al. (2018) study examined the employment of positioning strategies assessing congruence in the positioning of both indigenous and foreign retailers in Ghana. They argued that for the massive investments required by international retailers to launch or expand operations in a foreign market, congruence in positioning strategies is paramount to the success of the firm. They assessed the fit of congruence in perceptions by utilising the perceptions of customers, management and a content analysis of the organisation's commitment and branding (Blankson et al., 2018; Nkrumah et al., 2016).

This research adopts the congruence of perceptions defined as “the degree to which the needs, goals, objectives, and/or structure of one component are consistent with the needs, demands, goals, objectives, and/or structure of another component” (Eckstein, 1998: p. 40). Congruence in stakeholders' perceptions of critical factors involves a degree of fit, which ultimately results in the ability for the research to prioritize which factors are key for SWS implementation in ports like Abidjan where full roll-out is ongoing. Regarding the prioritization of critical factors,

congruence concerns the magnitude of correlations in judgments brought about by activities that take place between the intended and the achieved aspects of SWS implementation.

Data collected from semi-structure interviews and document analysis, were subjected to content analysis and a summary of the results is presented in Table 39. As shown in Table 39, an asterisk (*) implies that a certain factor is seen as key for SWS implementation.

Table 6-8 Summary of stakeholders' perception of factors key to SWS implementation.

CRITICAL FACTORS		Stage 1	STAKEHOLDERS /Interviewees /Stage 2				Stage 3				Stage 4			Stage 5	Document analysis
		P3	P4	P5	P6	P7	P2	P9	P14	P12	P10	P11	P13	P8	
1	Inadequate ICT Infrastructure						*				*	*		*	*
2	Lack of Top management support	*	*				*								*
3	Resistance to change from personnel	*									*				*
4	Lack of financial resources														
5	Lack of strong political will	*						*			*	*		*	*

6	Inadequate legal Framework	*						*			*	*	*	*
7	Lead agency's lack of clarity and inclusion													
8	Lack of partnership & collaboration among stakeholders												*	*
9	Fear of security and privacy	*												*
10	Political instability											*		*

Note: * denotes an agreement to the criticality of a factor.

Stage 1 concerns the implementation of SWS by the sole government agency responsible for port duties

Stage 2 concerns the implementation of SWS by public stakeholders

Stage 3 concerns the implementation of SWS by PAA, Shipping Agent, Insurance company, and a Stevedore company

Stage 4 concerns the implementation of SWS by Importers and Exporters, Clearing and forwarding agents, and Commercial Banks.

Stage 5 concerns the implementation of SWS by the implementing company interconnecting the SWS of CôteD'Ivoire with other SWS in West African countries.

6.4.1 Lack of strong political will

Content analysis of the results of the semi-structure interviews and document analysis show congruence and dominance of the factor “Lack of strong political will”. It is one of the two critical factors that achieved congruence (five out of fourteen) among the stakeholders. This makes it the most dominant factor together with the factor “Inadequate legal framework”. The stakeholders who perceive that the factor “Lack of strong political will” has reached a high level of criticality are (Org 3), shipping agents, import/export, clearing and forwarding agents, and the implementing company (Org 8).

“Lack of strong political will” impacts the implementation process because of the refusal of some managers to adopt the SWS, as can be seen in section 5.2.6. Therefore, a strong political will become necessary at some point to get key players such as the PAA and the Government

body aligned to tax collection on goods coming into and leaving Côte D'Ivoire on board the project. Across all the stages of implementation, this factor was deemed critical except in the second stage of implementation of SWS by public stakeholders that are more dependent on government for decision making. During the interviews, it was perceived that the lack of strong political will had caused delays in the implementation process of the SWS. This was confirmed by the results of document analysis, which revealed that after eight years, the implementation of the SWS in the port of Abidjan has still not reached its goal of a complete paperless system (GUCE-CI, 2021).

Even though the factors "Lack of strong political will" and "Inadequate Legal framework" have the same level of congruence, "Lack of strong political will" comes before because it emerges from the exchanges with participants that a speedy implementation of the SWS can

6.4.2 Inadequate Legal framework

"Inadequate legal framework" is one of the two factor that has a high level of congruence (five out of fourteen) among the stakeholders and across all the stages of implementation except the second stage. The five stakeholders for whom the criticality level is high include the following: (Org 3), the Importer/Exporter, the Clearing and Forwarding Agent, (Org 8), and the shipping agent. This is explained by the fact that, despite the laws put in place at the early stage of the implementation, some key laws on electronic signature are missing, which prevent a full dematerialisation of the SWS. In other words, the current legal framework in place in Côte D'Ivoire is not sufficient to achieve a full paperless SWS. This was also confirmed from the analysis of documents.

Even though the factors "Inadequate Legal framework" and "Lack of strong political will" have achieved the same congruence, "Inadequate Legal framework" comes after because it

emerges from the exchanges with participants that by the action of political will, the government at the beginning of the implementation system in 2014 enacted new laws to legalise the digitalisation of import and export procedures to facilitate the SWS implementation. Unfortunately, these laws had not taken into consideration all the requirement of digitalisation in trade such as electronic signature. Thus, hampering the smooth operationalisation at some stages of the implementation process (Kabui et al. 2019).

6.4.3 Inadequate ICT Infrastructure

Data collected from semi-structure interviews and document analysis, were subjected to content analysis showing congruence for the factor “Inadequate ICT Infrastructure” for four stakeholders out of fourteen. As a result of this finding, “Inadequate ICT Infrastructure” comes in right after the factor “Inadequate Legal framework”. Among the stakeholders for whom this critical factor is high are the PAA, Importers/Exporters, Clearing and Forwarding Agents, and the implementing company. Apart from the PAA (both private and public), these stakeholders are all private companies. According to participants’ perception, these stakeholders suffer the most from the consequences of “Inadequate ICT Infrastructure” because of lack of computer literacy, lack of e-readiness, the dysfunctionality of the SWS, the incompatibility of the SWS with some key stakeholders' systems such as the PAA, and unstable internet (Moros-Daza et al 2021). The SWS is a new technology that stakeholders are not yet familiar with. As a result, they lack qualified employees and technological infrastructures in sufficient quantities (Peterson, 2017). These findings are consistent with the results of document review.

6.4.4 Lack of top management support

Data collected from semi-structure interviews and document analysis was subjected to content analysis (de Chernatony & Cottam, 2009). Congruence of perception for the criticality of “Lack

of top management support”, is achieved for three stakeholders who are (Org 3), PAA, and (Org 4). As a result of this finding, “Lack of top management support” comes in right after the factor “Inadequate ICT Infrastructure”. The three stakeholders mentioned above largely govern import-export transactions in Cote D’Ivoire. Indeed, these three actors are regarded as very important because most activities associated with import and export involve them (Aryee & Hansen, 2022). Because of their strategic position and their progress toward their own personal dematerialisation, the leaders of these three stakeholders have opposed resistance to the idea of the SWS at the early stage. As a result, the implementation of the SWS was delayed in the respective organisations as confirmed by the results of document analysis in Chapter 4, section 4.7.2. The results of document review revealed that after eight years, the implementation of the SWS in the port of Abidjan has still not reached its goal of a complete paperless system (GUCECI, 2021).

6.4.5 Resistance to change from personnel

An analysis of the results from semi-structure interviews and document review shows congruence for the factor “Resistance to change from personnel” for two stakeholders out of fourteen. As a result of this finding, “Resistance to change from personnel” comes in right after the factor “Lack of top management support”. The stakeholders for whom the factor “Resistance to change from personnel” has reached a high level of criticality are the clearing and forward agents and (Org 3). The reason for this is that resistance to change from the personnel was felt the most among these two stakeholders, causing delays in the implementation of the SWS as some interview responses show.

“Public organizations personnel such as (Org 3) resisted change because they did not accept the idea that they could not perform physical checks on documents and could no longer

physically meet with clients..... This has led to the sacking of two IT directors from (Org 3)”P1

Participant revealed that, in some rare cases, resistance was manifested by violent attacks on the vehicles belonging to the implementing company's personnel. As stated by participants in section 5.2.3, workers were dissatisfied due to fear of losing their jobs.

6.4.6 Lack of Partnership and collaboration among stakeholders.

“Lack of Partnership and collaboration among stakeholders” is one of the three critical factors that achieved congruence (one out of fourteen) among the stakeholders. Based on this result, “Lack of Partnership and collaboration among stakeholders” come in a lower position after the factor “Resistance to change from personnel”. The stakeholders for whom the factor “Lack of Partnership and collaboration among stakeholders” has reached a high level of criticality is the implementing company. This is because the implementing company, had enormous difficulty connecting certain stakeholders to the SWS. This was confirmed through document review claiming that “Some stakeholders did not cooperate appropriately making difficult for the implementing company to work according to schedule.” (GUCE-C, 2021). In other words, the unwillingness of some managers to fully digitalise their system make them not to cooperate properly with the implementing company (Jovic et al., 2021).

6.4.7 Fear of Security and privacy

“Fear of Security and privacy” is one of the three critical factors that achieved congruence (one out of fourteen) among the fourteen stakeholders. Even though the factors “Fear of Security and privacy” and “Political instability” have achieved the same congruence, “Fear of Security and privacy” comes before because it emerges from the exchanges with participants that this factor impacts the SWS implementation process much more than the factor “Political

instability”, as is evident in Chapter 5. Only one stakeholder, the PAA, has reached a high level of criticality for the factor “Fear of security and privacy”. It is explained by the fact that the PAA delayed the implementation of the SWS because of fear that the data shared on the SWS platform will be hacked and used by competitors (Jiang et al. 2021). This finding is consistent with the result of document review.

6.4.8 Political instability

“Political instability” is the last of three critical factors that achieved congruence (one out of fourteen) among the fourteen stakeholders. In other words, all the stakeholders opined that political instability was a critical factor that negatively impacted the full implementation of SWS in Cote D’Ivoire. Even though the factor “Political instability” achieved the same congruence with two other factors (“Fear of Security and privacy” and “Lack of Partnership and collaboration among stakeholders”), it is the least regarded among the three factors because all the respondents averred that “Political instability” as a critical factor affects all stakeholders simultaneously when it occurs. However, since it hardly occurs, very few participants regarded it as a major challenge.

The only stakeholder who rated “Political instability” at a high level of criticality is importer/exporter. This is explained by the fact that importers and exporters, particularly small and medium-sized enterprises are severely impacted by political instability such as Coup d’état, civil unrests among others due to their low lobbying power and political reach as confirm through the document review. “Political instability” leads to delays, work stoppages and, in the worst case scenario, could result in the permanent closure of a company (Aryee et al., 2021).

"Political Instability" as a surprising factor in this research, can be compared with other factors using the similarity congruence matrix in Table 6.7 and Table 6.8.

The matrices in Table 6.7 and Table 6.8 highlights the level of criticality of each factor for each stakeholder group, based on data collected through interviews. As can be seen in Table 6.7 and Table 6.8, the "Political Instability" factor has a high level of criticality for the importer/exporter; a low level of criticality for Org 6, Stevedoring companies and Banks (financial institutions); and a medium level for all the other stakeholders (Org 3; Org 7; Org 5; Org 4; Org 8; PAA; Shipping Agent; Insurance Company and Clearing Agent). This implies that importers/exporters are the most affected by political instability, while other stakeholders are less affected or not affected at all by this factor.

It was also found that, except for smaller importers and exporters, lack of financial resources, like political instability, is not a critical factor for most stakeholders. This is justified by the fact that bigger private stakeholders such as Freight forwarder and Shipping Agent did not have to make any major investment to implement the SWS since they already have the basic ICT equipment and software required. In addition, document analysis confirmed that public stakeholders benefited from the free ICT equipment and software offered by the implementing company (GUCE-CI, 2021).

Based on stakeholders' perception and document review, political instability is a rare event that affects all stakeholders simultaneously when it occurs. However, when this happens, it can have devastating consequences for the trade facilitation process. For example, during the 2010-2011 post-election crisis in Côte d'Ivoire, political instability caused severe disruptions in the transport and logistics sector, leading to increased costs, delays and risks for traders (PAA, 2020). Similarly, in 2019, political unrest in Chile resulted in violent protests, roadblocks, and vandalism that affected the operations of ports, airports, and customs offices (World Bank, 2020). These examples demonstrate that political instability can have a significant negative impact on trade facilitation performance.

The significance of this finding lies in its unpredictability and potential to disrupt business processes and SWS implementation. Hence, it emphasizes the need for flexible and adaptable systems that can withstand sudden disruptions caused by political instability. Although instances of "political instability" are infrequent, their impact on importers, exporters, and the wider trading community can be devastating. Therefore, addressing this issue is essential to ensure the resilience and effectiveness of the Single Window System in the face of catastrophic events.

Tackling this issue requires a nuanced approach, as it goes beyond the framework of traditional SWS management. This involves acknowledging the vulnerability of the system to external geopolitical factors and preparing contingency plans to mitigate the consequences of political instability (World Bank, 2020). This surprising factor shows that the success of the SWS depends not only on overcoming daily challenges, but also on being prepared for exceptional events that can shake the foundations of international trade.

6.4.9 Lead agency's lack of clarity and inclusion

An analysis of the semi-structure interviews and document review shows that no congruence was achieved when it came to the criticality of factor "Lead agency's lack of clarity and inclusion". This factor is one of the two factors that achieved no congruence among the fourteen stakeholders. Even though some stakeholders have criticised the implementing company at the beginning of the project for lack of clarity and inclusion, these issues were quickly solved and never were a cause of delay. In other words, "Lead agency's lack of clarity and inclusion" is not key to the implementation of SWS in the port of Abidjan. In contrast to Wang (2016) who recommended that customs be the lead agency in SWS implementation, in the case of the port of Abidjan, (Org 6) has an overall approval from stakeholders.

6.4.10 Lack of Financial resources

“Lack of Financial resources” is one of the two factors that achieved no congruence among the fourteen stakeholders. Despite both factors ("Lack of Financial resources " and " Lead agency's lack of clarity and inclusion") not having achieved congruence among the fourteen stakeholders, the "Lack of Financial resources" comes as the last of the two and the last of the ten critical factors because participants indicate that "Lack of Financial resources" has the least impact on the implementation process of SWS in Abidjan.

This is mainly due to the PPP business model chosen by the government for SWS

Implementation (Jovic et al., 2021). As confirmed by participant in section 5.2.5 the costs of training and acquiring ICT products, did not result in stagnating or interrupting the implementation of the SWS because the implementing company in partnership with the government accounted for the cost of training all stakeholders and the cost of acquiring IT equipment for public stakeholders (GUCE-CI, 2021).

6.5 Mapping of the TOE categories with the different implementation stages based on the “High” level of criticality

In this section, the TOE categories (Technological, Organisational, and Environmental) are mapped with the SWS implementation stages based on the critical factors scoring “High” as seen in Table 6.2.

In figure 6.1, Technological context, which is the first category of the TOE theory does not have factors of a high level of criticality at the first and second stage of implementation of the SWS. This reveals the fact that the technological context in the TOE is not a stepping block

for the implementation of SWS at stage 1 and 2 in the port of Abidjan. This is explained by the fact that in Côte D'Ivoire like other developing countries in West Africa, there is a minimum of technological infrastructure, which allows stage 1 and 2 to start an implementation of the SWS (World Bank, 2021).

Unlike the technological context of the TOE, the Organizational and Environmental context both have factors of a “High” level of criticality at all stages of SWS implementation. This reveals that the biggest challenges faced by the authorities for a successful implementation of the SWS come from the organizational context and environmental context of the TOE. Consequently, it indicates how critical these two organizational and environmental contexts of the TOE are to implementing SWS. Furthermore, as can be seen in figure 6.1, the researcher has added some new subcategories to the organizational and environmental context of the TOE framework to adapt it to SWS implementation.

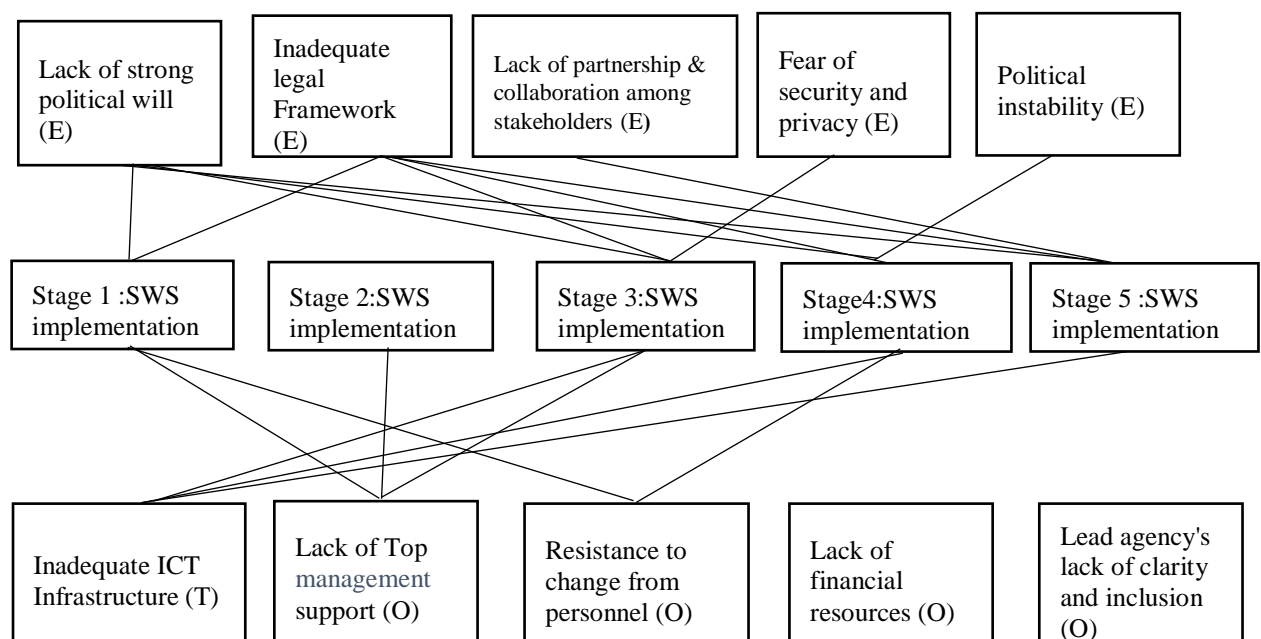


Figure 6-1 Mapping of the TOE categories with SWS implementation stages using the “High” category.

Note: (T) means Technological category of the TOE

(O) means Organisational category of the TOE

(E) means Environmental category of the TOE

6.6 Revised framework for SWS implementation

In this section, the emphasis was placed on revising the proposed framework for SWS implementation in the context of developing countries using the port of Abidjan as a case study. As seen in Appendix 5, specific questions derived from the critical factors with open questions were developed to test the proposed framework. Using interviews with 14 public and private stakeholders, the researcher gathered relevant information. As a result of multiple respondents, the responses from stakeholders helped to put the framework in perspective with regards to its applicability in the port of Abidjan. After thematic analysis of the results of the interviews, a new factor (Political instability) emerged that helped clarify where the research fits in relation to already existing knowledge.

The revised framework both identifies and prioritises the key critical factors influencing SWS implementation within the context of developing countries using the conceptual congruence model (section 6.4). It also identifies the different implementation stages, which would enable scholars and researchers to prioritise, in order of relevance, the key actions required for successful implementation of the SWS within the context of developing countries.

In exploring the TOE theory, the revised framework enable its application for a wider ICT context since it helps researchers understand and explain why Port authorities are interested in implementing SWS and what challenges they face trying to implement a full paperless version. For example, this study revealed that the Ivorian SWS is not yet a completely paperless system

after eight (8) years of implementation. The revised framework comes as a remedial framework to help government officials and port authorities to know the challenges that can cause such a delay in the implementation process of SWS within the context of developing countries using the port of Abidjan as a case study. By using the fit of perceptions as a congruence model, the top four critical factors influencing SWS implementation revealed the following prioritisation in this order. First is the “Lack of strong political will”. Second is the “Inadequate Legal Framework”. Third is the “Inadequate ICT infrastructure”, and fourth is the “Lack of Top management support”.

As a result of the prioritisation, it can be said that firstly, in a developing country context, a strong government support is a prerequisite for total dematerialization of a SWS. Secondly, the government will have to put in place all the necessary legislation to support a total dematerialization of the SWS. Thirdly, the government must ensure that there is adequate ICT infrastructure that facilitates access and transactions on the platform. Fourthly, the managers of the different organizations involved in the project must be sufficiently immersed in the project and accept it. This will facilitate their participation in the project.

In addition to identifying the critical factors influencing SWS implementation in the context of developing countries, a crucial aspect of the revised framework is the determination of the different implementation stages of the SWS. Furthermore, through this study, the criticality of the factors at every implementation stage per stakeholder was revealed, as can be seen in Table 6.2, section 6.3.

The Single Window System (SWS) road-map framework (Figure 2.3) illustrates how SWS is implemented with the different implementation stages and the key actors at every implementation stage, as seen in section 2.9.2. Following the validation of the proposed

framework through the semi-structured interviews with public and private stakeholders, this research led to the identification of Customs and Port authorities as key actors for SWS implementation within the context of developing countries. These two actors are regarded as very important to the SWS implementation process since most activities associated with import and export involve them. Additionally, they exert influence over other stakeholders. Furthermore, based on the revised framework, five stages of SWS implementation have been identified.

As highlighted in the revised framework in Figure 6.2, two parts form the revised framework:

SWS implementation factors – Identifying the Technological, Organisational and Environmental critical factors with possible new factors within the TOE context (Tornatzky and Fleischer 1990) (Comprehensive Barrier Framework - Lam, 2005) (Single Window Implementation Framework –UNECE, 2013)

Identifying the different implementation stage of the SWS (Single Window System roadmap framework –UNECE, 2013)

Following validation of the proposed framework, the researcher believes this step-by-step implementation process will enable managers and academicians to gain a holistic understanding of the critical factors affecting SWS implementation and to appreciate the differences between theory and practice within the context of the application of SWS. Additionally, the framework will be beneficial for deploying and evaluating SWS implementation, both in Côte D'Ivoire and in developing countries in general.

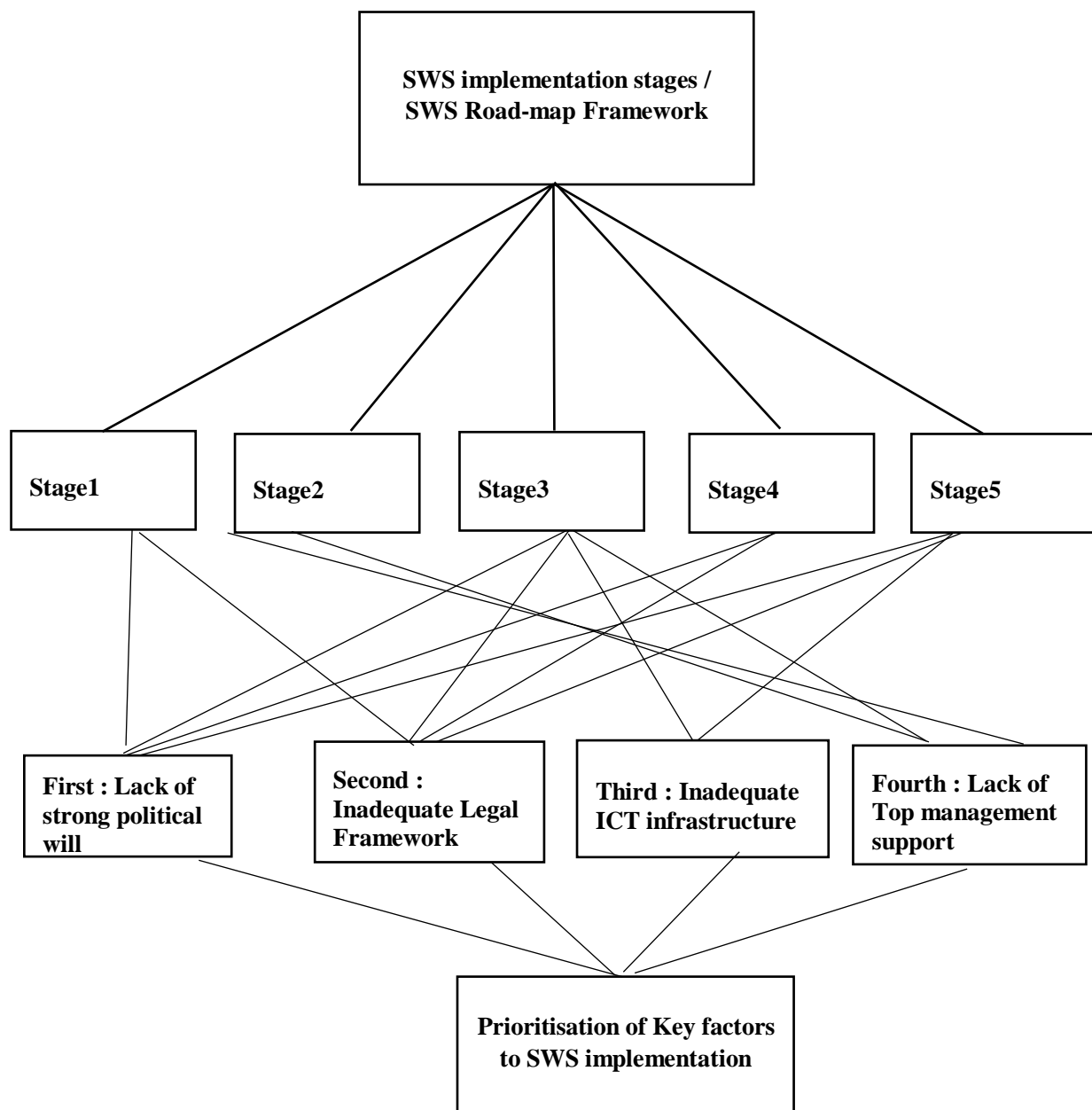


Figure 6-2 Proposed and revised SWS implementation Framework

Conclusion

This chapter has shown that the criticality of the factors varies by stage of implementation and by stakeholder. Stage 2, for example, where public stakeholders are predominant, has only one critical factor, "Lack of top management support", which is perceived as highly critical.

However, all the other stages of implementation have four to six critical factors that reach the High level of criticality. This result shows that public stakeholders compared to private stakeholders are less influenced by critical factors during SWS implementation. Based on the results of this study, a functional approach that considers the criticality of each of the ten (10) critical factors at each stage of the process has been proposed in Figure 6.2 for the implementation of SWS in the context of developing country using the port of Abidjan as a case study.

Chapter Seven Research Conclusion

7.1 Introduction

This chapter concludes the study and summarises the various steps discussed in the previous chapters. Furthermore, chapter 7 discusses the contributions made to the body of theory and practice, relating to critical factors influencing SWS implementation in the context of developing countries using the port of Abidjan as a case study. Also, in this chapter, research limitations are examined before making some recommendations for future research.

This research project is the first study to investigate the critical factors influencing SWS implementation at every implementation stage per stakeholder. Given the importance of SWS for port competitiveness and trade facilitation (Kabui et al., 2019), this study's findings are relevant to theory and practitioners alike.

7.2 Achievement of research objectives and findings

This research aimed at evaluating the criticality of factors influencing negatively SWS in the port of Abidjan at every implementation stage from stakeholders' perspectives. The research carried out case study research of public and private stakeholders using the SWS in the port of Abidjan, with a generic view of establishing whether the following objectives could be achieved:

7.2.1 Objective 1: Critically review and analyse existing theories relating to SWS implementation. Which would enable the development of a framework for evaluating SWS implementation in the port of Abidjan.

The research reviewed existing literature and theoretical frameworks relating to SWS including the e-government framework reflecting technology implementation in public and private administration. Upon reviewing the literature on critical factors affecting SWS implementation, the results indicate they are generalised, with no unified theoretical framework associated with their implementation. As a result, the researcher proposed a framework that combined the TOE framework studying its Technological, Organisational and Environmental context with the Comprehensive Barrier Framework, the Single Window Implementation Framework (SWIF) and the SWS Road-map Framework.

From the combination of the frameworks mentioned above, the researcher came up with nine (9) critical factors influencing SWS implementation. The questions used for the interviews were mainly derived from these critical factors added with some open questions.

According to Hoti (2015), many authors used the TOE framework to understand the adoption of different information systems (IS), such as: e-commerce (Zhu et al., 2006); and egovernment (Walker, 2008; Reddick, 2009). The literature asserts that the influential factors identified in the TOE Framework are similar to those related to e-government system development. The researcher was able to import the factors within the TOE framework to SWS implementation considering the similarities between the SWS and E-government, as seen in section 2.2. In fact, according to Kabui, et al. (2019), SWS can be visualised as a collection of IT-driven business services, which form into non-overlapping categories and hierarchical structures.

In this research, the Single Window System (SWS) Road-map framework provides an overview of how SWS works. According to UNECE (2013), there are five distinct stages of

maturity based on the SWS Road-map framework. In addition, the key stakeholders are identified at each stage of implementation, making the SWS Road-map framework a valuable tool for answering the research questions.

The researcher successfully tested and validated the proposed framework through interviews with public and private stakeholders that utilise the SWS. Therefore, the researcher has achieved objective one by reviewing existing theories and frameworks and developing a framework to evaluate SWS implementation within the context of developing countries, with the port of Abidjan as a case study.

7.2.2 Objective 2: Identify and define the critical factors, the different stages, and key stakeholders involved in the implementation of SWS in the port of Abidjan.

The proposed framework adopted the TOE as the main theory to inform the researcher in identifying and categorising the critical factors and sub-factors that influence SWS implementation. The researcher also adopted the Single Window System Road-map framework developed by UNECE (2013). It provides the different implementation stages of a SWS along with the key actors at every implementation stage. In addition, the researcher used the Single Window Implementation Framework (SWIF) and the Comprehensive Barrier Framework to help identify factors influencing SWS implementation. By using the Single Window Implementation Framework (SWIF), the research findings identified the most relevant factors that affect the SWS over the ten stages of development identified by UNECE (2013).

Applying the Comprehensive Barrier Framework in this study helped in recognition of critical factors that affect the effective implementation of SWS. By using the Comprehensive Barrier

Framework, Lam (2005) identified a wide range of barriers to e-government integration, categorising them into strategy, technology, policy, and organisational domains. Considering the similarities between e-government and SWS, as discussed in section 2.2, the author was able to identify similar critical factors to SWS implementation.

Based on a review of the literature, a need for identifying the most influential stakeholders has been identified. This is because the extant literature mostly centred on stakeholders and their roles in general. Thus, this research led to the identification of Customs and Port authorities as key stakeholders for SWS implementation. These two actors are regarded as very important to the SWS implementation process since most activities associated with import and export involve them. Additionally, they exert influence over other stakeholders. But despite the impact of these two key actors, it was suggested that direct involvement from the president or the prime minister was still vital for a successful implementation of the SWS in a developing country like Côte D'Ivoire.

Using the four frameworks outlined above, the researcher was able to identify and determine the critical factors, the sub-factors, the implementation stages, and the key stakeholders involved in SWS implementation in developing countries. Thus, helping achieve objective 2 of this research.

7.2.3 Objective 3: Define those critical factors that are specifics to the port of Abidjan across the different stages of implementation.

The findings suggest that most of the critical factors and sub-factors that influence the SWS implementation in the port of Abidjan (Côte d'Ivoire) are similar to those seen in existing literature. However, some are specific to the Ivorian context. For example, power cuts and political instability, are found in this research to negatively affect the implementation of SWS

in the port of Abidjan. Some public and private stakeholders whose production is mainly dependent on electricity are forced to use generating plants as backup power sources. The supply of stable electricity power is key for developing countries' development (Moros-Daza et al., 2021). Therefore, government should address the issue while maintaining a peaceful political environment to successfully implement SWS.

Following the identification of the factor “Political instabililility” as a critical factor specific to Côte D’Ivoire, objective 3 of this research was achieved. Furthermore, the researcher made some modifications, especially in presenting the revised framework, as can be seen in section 6.6.

7.2.4 Objective 4: Provide a framework for prioritising the criticality of factors influencing the SWS at every implementation stage per stakeholder.

The criticality of the factors identified in this study were examined on two levels. Firstly, the researcher examined the perceived criticality of factors influencing the SWS at every implementation stage. This made it possible to prioritise the critical factors at every implementation stage as seen in section 6.3. The results of the prioritisation at every implementation stage shows that the criticality of the ten factors is perceived differently by stakeholders. In other words, the impact of critical factors depends on the stage of implementation and the type of stakeholder. Additionally, the results of this study indicate that public stakeholders are less affected by critical factors during the implementation of SWS than private stakeholders as seen in section 6.3. This is due to the fact that Public stakeholders receive more assistance from the government to help with SWS implementation as compared to private stakeholders (GUCE-CI, 2021).

Secondly, the research identified the overall critical factors key to SWS implementation using the conceptual congruence model as can be seen in section 6.4 and Table 6.8. By using the fit of perceptions as a congruence model, the top four critical factors influencing SWS implementation revealed the following prioritisation in this order. First is the “Lack of strong political will”. Second is the “Inadequate Legal Framework”. Third is the “Inadequate ICT infrastructure”, and fourth is the “Lack of Top management support”.

The study also shows that at stage 5 of the Ivorian SWS, where six critical factors have reached the highest level of criticality, the project is completely stalled as can be seen in section 6.3 and Table 6.7. In order to facilitate the implementation of SWS at stage 5, the government should have an IT architecture that could integrate and support the diverse IT systems and applications of relevant stakeholders. In addition, the relevant stakeholders need to be efficiently involve in the project design and testing by creating incentives and motivations for change, and building knowledge and skills of the people involved in the project (Torlak et al., 2020). As part of accelerating the implementation of SWS, governments of developing countries, especially those in West Africa, should do more to help private stakeholders by reducing the tax duties on equipment and services that are essential to the success of SWS projects (GUCE-CI, 2021).

Based on the findings above, it is sound to state that the researcher has achieved research objective four by providing a framework to investigate the perceived criticality of the critical factors influencing SWS implementation in developing countries context.

7.3 Contribution to the body of knowledge

The conclusions derived from the analysis of the critical factors influencing SWS implementation in this study contribute to theory and practice for researcher and decision makers. Below are the contributions discussed:

7.3.1 Contribution to Theory

From the research analysis and findings in the preceding chapters, the researcher concluded that there is currently no study that examines critical factors and theoretical frameworks together for the implementation of SWS in developing countries, using the port of Abidjan as a case study. Therefore, this study contributes to the SWS implementation literature by proposing a framework that allow the identification and prioritisation of critical factors, the identification of the different implementation stages, and the key stakeholders involved at every stage.

Secondly, based on literature review and research findings, the research was able to establish critical factors influencing SWS implementation within the TOE context with new subcategories to the TOE framework identified, as shown in Table 7.1 and figure 7.1.

Table 7-1 Mapping of critical factors influencing SWS implementation within the TOE context

TOE Context	Factors
Technological context	Inadequate ICT Infrastructure
Organisational context	Lack of Top management support
	Resistance to change from personnel
	Lead agency's lack of clarity and inclusion
	Lack of financial resources
Environmental context	Inadequate legal Framework
	Lack of strong political will
	Lack of partnership & collaboration among stakeholders
	Fear of security and privacy
	Political instability

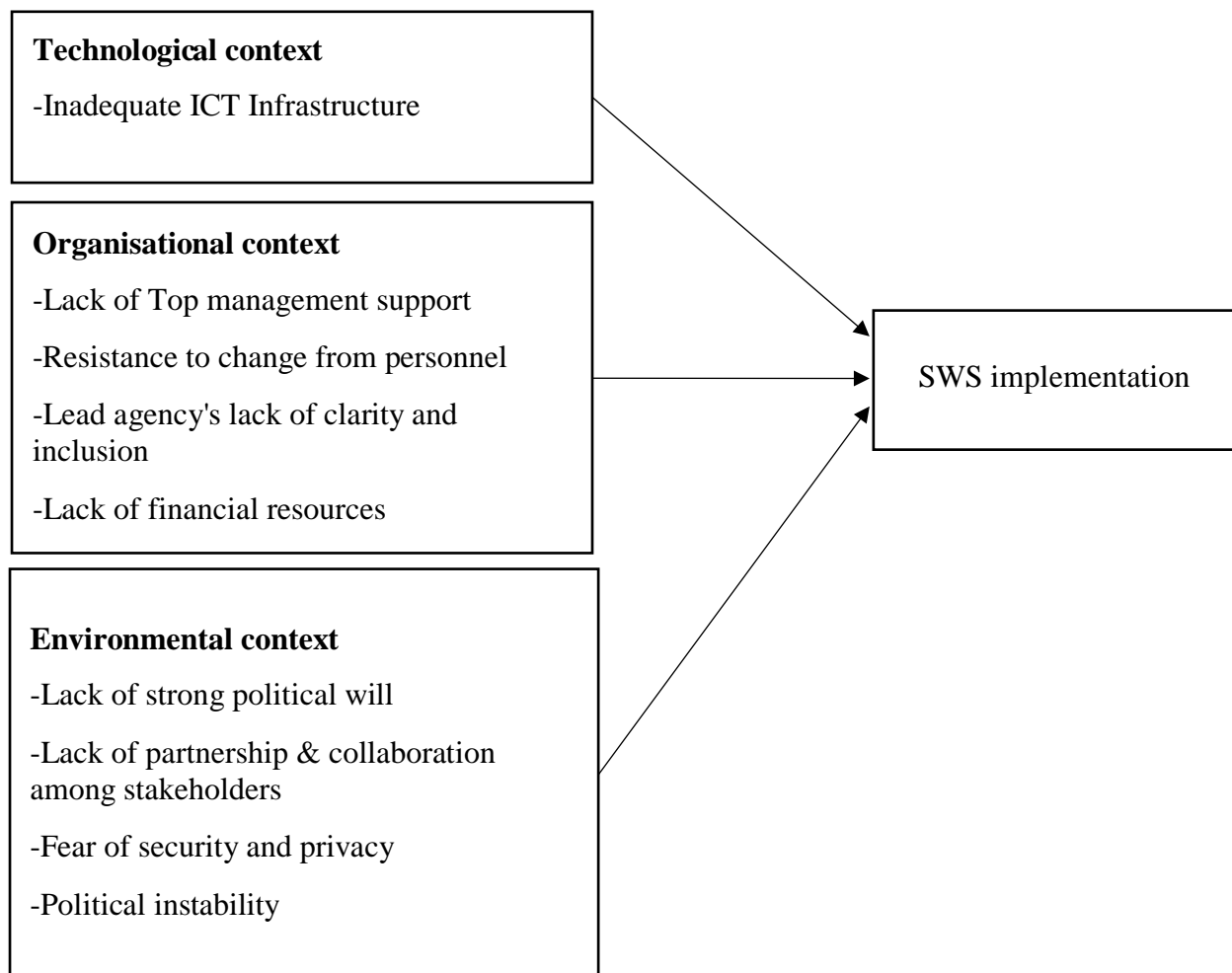


Figure 7-1 Adopted TOE Framework for SWS implementation

Thirdly, it was found that factors relating to organizational and environmental context of the TOE have contributed to the stagnation of the SWS implementation at all stages. However, factors relating to technological context contributed to the stagnation of the SWS only at stage 3, 4 and 5. In light of these results, it can be concluded that while the technological context is important for the implementation of a SWS, the greatest challenges the authorities are facing are related to the organizational and environmental context of the TOE.

7.3.2 Contribution to practice

This study also contributes to managerial practice based on the findings of this research. Given the relevance of SWS for port competitiveness and trade facilitation (Kabui et al., 2019), this study's conclusions provide the opportunity to offer the participating stakeholders and probably other West African ports transferable relevant information that can be utilised to facilitate SWS in their ports (Tracy, 2000). The transferability of this research may be enhanced by the fact that most West African ports have the same private operators (Bollere, MSC, Maersk Line) (IPCOEA, 2021). Thus, the same working methods are found at these ports. Additionally, these countries meet most of the political, economic, social, and environmental conditions of Côte d'Ivoire (World Bank, 2020).

Unlike previous studies on SWS, this study extends our understanding further by evaluating the criticality of factors and by mapping the critical factors of SWS with key stakeholders at every implementation stage. This would enable decision-makers to determine which factors are critical for each key stakeholder at every implementation stage of the SWS. Thus, allowing the prioritisation of decision makers' actions to minimise the impact of challenges in the implementation process of SWS.

The contribution to practice is especially relevant today, since businesses operate in increasingly changing environments (Dutta & Lanvin, 2020), mainly following the Covid-19 pandemic that has prompted the need for digitalisation (IPCOEA, 2021). Following are a summary of recommendations made to this study's participants and possibly other developing country ports:

Firstly, based on the findings of this study, the success of developing countries' SWS would largely depend on government support and available resources. In other words, the

Government has a crucial role to play, particularly in areas of legislation and regulations to control SWS activities (Joshi, 2016). Funding should be made available to improve ICT infrastructure, education, and training of public and private stakeholders' personnel.

Secondly, considering the challenges of mobilising support from the stakeholders, using an “Idea Champion” approach is recommended. An “idea champion” approach rests on one highly respected person who can coordinate and overcome obstacles by leveraging close personal ties and pursuing informal avenues of influence. This person could be the president of the country or the Prime Minister. This solution worked in the republic of Benin, where the “idea champion” is the country's president. Also, in Ghana, it helped advance the port's SWS implementation with the president being the “idea champion” (IPCOEA, 2021).

Thirdly, developing countries would benefit from establishing an independent monitoring and evaluation body, supported by the government but independent in its operation and structure. This would help monitor SWS projects closely and ensure transparency or expose any corruption (Caldeirinha et al., 2022).

Lastly, the public and private stakeholders need to attract, retain, and develop staff with skills and competencies in the business process analysis, project management and IT areas, which are crucial for the sustainability of the Single Window System (Aryee & Hansen, 2022).

7.3.3 Lessons learned and applications to other developing countries

This research provides several key lessons that can be applied to other developing countries seeking to implement a Single Window System (SWS) in their ports. While the case study focused specifically on the port of Abidjan in Côte d'Ivoire, many other developing countries face similar challenges that must be addressed for successful SWS implementation.

One of the most important lessons is the need for strong government support and commitment throughout the implementation process. As was evident in the case of Côte d'Ivoire, “lack of strong political will” was one of the main factors hindering full rollout of the SWS. Without a high-level political backing to both encourage and compel stakeholder participation and cooperation, progress will be slow.

Other developing countries can apply this lesson by ensuring the highest level of political endorsement of the SWS project from the upper echelons of government (the office of the presidency). An "idea champion" approach where the head of state takes personal responsibility for the initiative can help overcome obstacles (GUCE-CI, 2021). Government commitment must also translate into allocation of sufficient financial resources and willingness to modify laws and regulations as needed.

An adequate legal framework is essential for implementing a paperless SWS, yet this was lacking in Côte d'Ivoire. Developing countries must assess existing laws and be prepared to enact new legislation covering areas like electronic signatures, data privacy, cybersecurity and e-transactions. Laws may also be needed to mandate the use of the SWS by traders and participating government agencies. The exact legal regulations will differ based on each country's starting point or may be adapted to reflect each country's circumstance and progress. However, this study asserts that the political will to craft a comprehensive legal framework should be secured upfront, rather than later when the implementation process is in motion. This can be coupled with stakeholder consultations to help determine high priority areas for legal reform.

While Côte d'Ivoire had basic ICT in place, inadequate infrastructure posed a major barrier. Unstable internet connectivity, limited internet data bandwidth and overall computer illiteracy

of the working populace, hampered the SWS rollout. Developing countries must devote resources to upgrading ICT infrastructure and networks to support an electronic SWS. Governments can assist by removing taxes on essential ICT imports and services needed for SWS implementation. Public access centres with computers and internet can also help bridge the digital gap. Training programs should target both government personnel and private sector stakeholders to improve digital skills.

Resistance to change was another key factor uncovered in Côte d'Ivoire. Personnel from some public stakeholders opposed new digital processes that threatened traditional ways of working. Developing countries must employ change management strategies to secure buy-in at both organizational and individual levels respectively. Change management plans can encompass training on new systems, demonstrating benefits, incentivizing usage, phased rollout, and addressing specific concerns. Leadership messaging and visioning are important to shift mindsets and cultures accustomed to paper processes. Change management is an ongoing process requiring dedicated resources and oversight.

The relative importance of different critical factors may vary based on each country's specific context. For example, landlocked developing countries highly dependent on neighbour's seaports will prioritize regional interoperability with transit country SWS platforms. Small island nations with tourism-based economies may emphasize connectivity with airline systems. Post-conflict countries struggling with political instability may focus first on resilience and data backups.

While the broad factors identified in Côte d'Ivoire provide a useful starting checklist, countries should re-classify which ones are high, medium or low priority based on their unique macro-environmental circumstances. This contextual reprioritization can help developing countries

customize SWS implementation for maximum impact. Periodic re-evaluation of factors can also account for changing conditions over time.

Overall, developing countries can apply several insights and lessons from Côte d'Ivoire's experience in planning their own SWS initiatives. No two countries are identical, especially since each has its own ideology; as such adaptation is needed. Nevertheless, the key factors, implementation phases, stakeholder engagement strategies, change management techniques and national-regional considerations can inform SWS rollout in developing country contexts worldwide. As more nations establish SWS platforms, knowledge sharing will be invaluable to accelerate trade growth and sustainable development.

7.4 Limitation of the research methodology and areas for future research

This section builds on the description of the research design and methodology in chapter four. It reflects the methodological approach, the limitations outlined here, and the potential improvements to the process.

Firstly, this qualitative research was conducted using fourteen stakeholders that use the SWS for import/ export transaction through the port of Abidjan. These fourteen stakeholders are a representative of the broader population of stakeholders (Saunders et al., 2012) using the SWS.

Given that the research is qualitative, generalisations have not been sought after. Instead, this study is transferable to other West African ports by making connections between elements of this study and the experience of other West African ports (Tracy, 2000).

Access to the sample was limited to the participants' availability or interest in the research topic. Due to the research's voluntary nature, the research experienced some difficulties since not all respondents initially approached were willing to take part in the study. Some participants

were reluctant to participate in the project mainly for reasons of confidentiality. This reluctance was more felt at the level of public stakeholders, one of whom refused to be recorded during the interview. This difficulty made it difficult to obtain an interview date with the public stakeholders. It was also noted that the duration of the interview with the stakeholder who refused to be recorded was one of the longest.

The in-depth interview itself also posed some limitations in terms of the participants' ability to recall their experiences. There is the possibility that the responses narrated were different from what transpire or incomplete. Thus, relevant information could have been purposefully or unconsciously omitted, which in some cases was identified through data triangulation from the fourteen different stakeholder responses.

Given the limitations of this present study, some ideas for further research were identified and presented.

Firstly, further research is required to extend this study's results by adopting a multiple case study approach to investigate the findings' implication in other West African ports or developing countries ports. Adopting a multiple case-study approach will provide rich insight extended from the results of this present research. Therefore, more research is called for to investigate the critical factors influencing SWS implementation in West Africa and other developing countries. Recent occurrences around the world, such as Covid-19, have signalled to the research community and port authorities the need to speed up the implementation of fully paperless SWS in developing countries and West Africa ports in particular.

Additionally, the criticality of factors influencing SWS implementation needs to be further investigated to obtain quantifiable measurements of the impact of the critical factors by utilising a quantitative or mixed-method approach. In this research, the criticality of factors

were evaluated using a thematic inductive coding with three codes/categories (High, Medium, Low) as a starting point for future studies to explore it in depth.

7.5 Concluding remarks

This doctoral dissertation assessed the critical factors associated with SWS implementation in a developing country context (with the port of Abidjan as a case study) by adopting the TOE as the main theoretical framework and using a semi structured interview with fourteen stakeholders.

The results of this research indicate that, the impact of the critical factors varies according to the stage of implementation of the SWS and the stakeholders. “Lack of strong political will”, “Inadequate Legal Framework”, “Inadequate ICT infrastructure” and “Lack of Top management support” were also identified as key factors to SWS implementation in developing countries context (with the port of Abidjan as a case study).

After conducting the literature review, the researcher expected the critical factors identified to be confirmed by the semi-structured interviews based on the arguments made by earlier scholars. However, the researcher maintained an open-mind, free of assumptions, throughout and following the data analysis. Nevertheless, the study's findings met the expectations of the researcher, with all nine critical factors being confirmed.

Although the findings met the expectation of the research, the results also exceeded them with a new critical factor specific to Côte D'Ivoire identified (political instability) and new subcategories were added to the TOE framework. Furthermore, for the first time, critical factors of SWS were mapped for every stakeholder at every stage of implementation.

The proposed framework was validated through semi-structured interviews carried out to identify and assess critical factors influencing SWS implementation at every implementation stage, as well as identifying the key stakeholders for SWS implementation within a port. Based on the research findings, the proposed framework was modified to include the new critical factor “Political instability”.

In spite of the challenges and limitations, the researcher was able to make recommendations for future studies as well as for decision-makers in developing countries, particularly in West Africa. Based on the findings, it was evident that the success of SWS implementation within the port would be largely dependent on strong government support, availability of the appropriate legal framework and efficient ICT infrastructure. It should also be mentioned that the key stakeholders such as the Customs and Port authorities should be given a prominent place in the SWS implementation process given the determining role they play in port activity.

Since the implementation of SWS in the port of Abidjan is novel with no study at this level, this research makes a valuable contribution to the field of SWS in ports. Though the findings of this research are Côte D’Ivoire based, they can however, with necessary variation be transferred to guide SWS implementation in developing countries, especially within the West African region.

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Appendices

Appendix 1: Initial Email to Organisations

Title of Project: Evaluating critical factors to the implementation of Single window system (SWS) in The case of Abidjan port – from stakeholders’ perspectives

Name and Contact Details of Researcher(s): Dago Alain Gohomene, Bsc (Hons), Msc, Mphil, PhD Researcher (up880550@myport.ac.uk)

Name and Contact Details of Supervisor: Dr Jana Ries (jana.ries@port.ac.uk) and Professor Mark Xu (mark.xu@port.ac.uk)

Ethics Committee Reference Number:

I am a research student at the University of Portsmouth, United Kingdom. I am currently undertaking a doctoral study entitled an evaluation model for implementing a Single Window System (SWS) in the port of Abidjan (Côte D’Ivoire).

The study aims to identify the critical factors that influence the implementation of Single Window System in the port of Abidjan (Côte D’Ivoire) within the context of developing countries.

I would really appreciate your assistance and cooperation with my research. Your organisation’s contribution would be greatly appreciated. With your permission, an email will be sent to the potential participants. This email will be asking for their participation, would include information to gain their consent, information on the research and would iterate that participation is voluntary and responses would be confidential. This email would include link for an online form where participants can sign in and provide consent. This way, once the participants sign the consent form on the link, it would be sent directly to me.

This research focuses on SWS implementation in the port of Abidjan. Therefore, the research population are people involve in the implementation process of SWS in their organisations. Due to the nature of the analysis, the research population would be operational level and managerial level employees. For example, The SWS being mainly an IT system, the selected interviewees will have to include the Director of IT system where required.

No research has been carried on the critical factors influencing SWS implementation in the port of Abidjan. I hope to shed some light on this with my research. The success of my research is greatly dependent on your organisation's support and participation. Participation in my research is voluntary and any response will be anonymous. The responses would be the basis of my analysis and there would be no reference made to the company.

Once I receive the consent form from the participant, depending on his availability an interview date will be arrange within the best possible time. After the interview, there would be no further involvement from the participants. I will go on to analyse these responses and use them as part of my thesis. This research and analysis are grounded on strict confidentiality. The University of Portsmouth Ethics Committee has granted ethical approval BAL/xxxxxxx to this research project.

Thank you for taking the time to read my email. I really appreciate it and I look forward to hearing from you. If you have any questions or require more clearance, please do not hesitate to contact me.

Yours Sincerely,

Dago Alain Gohomene

Appendix 2: Consent form

Title of Project: Evaluating the implementation of Single window system (SWS) in developing countries' ports: The case of Abidjan port..

Name and Contact Details of Researcher: Dago Alain Gohomene, Bsc (Hons), Msc, Mphil
PhD Researcher (up880550@myport.ac.uk)

Name and Contact Details of Supervisor: Dr Jana Ries jana.ries@port.ac.uk and Professor
Mark Xu mark.xu@port.ac.uk.

University Data Protection Officer: Samantha Hill, 023 9284
3642 or data-

protection@port.ac.uk

Please initial box

Ethics Committee Reference Number:

I confirm that I have read and understood the information sheet
dated.....) for the above study. I have had the opportunity to consider the
information, ask questions and have had these answered satisfactorily.

I understand that my participation is voluntary and that I am free to withdraw at any time
without giving any reason.

I understand that data collected during this study will be processed in accordance with data
protection law as explained in the Participant Information Sheet.

I understand that the interview will be recorded offline using a digital tape recorder.



I agree to take part in the above study.

Name of Participant:

Date: Signature:

Name of Researcher:

Date: Signature:

Appendix 3: Participant information sheet

Title of Project: Evaluating critical factors to the implementation of Single window system (SWS) in The case of Abidjan port – from stakeholders’ perspectives

Name and Contact Details of Researcher(s): Dago Alain Gohomene, Bsc (Hons), Msc, Mphil, PhD Researcher (up880550@myport.ac.uk)

Name and Contact Details of Supervisor: Dr Jana Ries (jana.ries@port.ac.uk) and Professor Mark Xu (mark.xu@port.ac.uk)

Ethics Committee Reference Number:

1. Invitation

I am Dago Alain Gohomene, a PhD Researcher at the University of Portsmouth. I would like to invite you to take part in my research study. Before you decide, I would like you to understand why the research is being done and what it would involve for you. The following participant information sheet outlines relevant information that will help you decide whether

or not you would like to take part and answer any questions you may have. The interview should take about 40 minutes. Please contact me or my supervisors if you have any questions.

2. Study Summary

This study is concerned with developing a framework to explain critical factors that influence implementation of SWS in the port of Abidjan (Côte D'Ivoire). This topic is important because it will inform decision makers that are involved in the implementation process of the SWS and allow for the prioritisation of their actions to minimize the impact of challenges in the implementation process. My research objectives are:

1/ Critically review and analyse existing theories, relating to SWS implementation. Which would enable the development of conceptual framework for evaluating SWS implementation in the port of Abidjan.

2/ Identify through a process mapping of the Ivorian SWS, the key stakeholders involve in its implementation, how they interact and their main activities throughout the development life cycle of the system.

3/ Explore the potential for country specifics of such SWS implementation framework using the case of the port of Abidjan.

4/ Investigate The perceived criticality of factors identified through the literature review and the interviews.

5/Analyse implementation issues with the adoption of the conceptual framework by Ivorian Government agencies and private stakeholders in developing country context.

Participation in this project is limited to people with extensive experience in Ivorian government agencies issuing permits for import and export purpose and on the other hand,

private companies such as implementing companies and other private stakeholders using the SWS for trade purpose (e.g Shipping companies etc.). Operational level and managerial level employees are targeted for the interviews.

What is the purpose of the study?

The current research problem tackles the implementation factors influencing Single Window System (SWS) in developing countries, using case study research approach focusing on Côte D'Ivoire's SWS. It is important to note that, previous studies on SWS lacks the consideration of technology adoption theory to provide a guiding framework of challenges influencing the implementation of SWS. Therefore, the case study of Côte D'Ivoire will help to investigate any feature changes in the TOE for SWS implementation. Considering the fact that there is a little existing knowledge about our topic, and considering the benefit of an exploratory research, a qualitative approach was chosen mainly in this study.

Why have I been invited?

You were selected because of your extensive experience at operational and/or Managerial level in a public department or private organisation using the SWS for trade purpose. I would like to invite you as an individual, not as a representative of your employing organisation to participate in this project.

Do I have to take part?

No, taking part in this research is entirely voluntary. It is up to you to decide if you want to volunteer for the study. If you agree to take part, I will then ask you to sign the attached consent form, dated xxx, version number, xxx.

What will happen to me if I take part?

Your participation will be anonymous, and will involve participating in a google meet (or similar) interview of approximately 40 minutes, during which I will collect your thoughts and opinions based on the interview schedule below. The interview will be recorded offline using a digital tape recorder. Participants' data will not be identifiable in any publication or reporting. As required by the University of Portsmouth, all research data (interview responses and analysis) will be stored in a password protected electronic file at University of Portsmouth for a minimum period of ten years before being destroyed. Control of access to the data is determined by University of Portsmouth data access protocols, and only members of the research team will have access to the data.

7. Expenses and payments

Throughout this thesis, I am self-funded. Therefore, I will not be able to pay participants for their time or other expenses associated with the research.

Anything else I will have to do?

If you wish to participate in this research, you can contact me on my email that is provided on this information sheet.

What data will be collected and / or measurements taken?

During the interview, I will collect your thoughts and opinions based on the interview schedule below.

What are the possible disadvantages, burdens, and risks of taking part?

There are no risks anticipated, given that the information will be anonymised. You can review your answers before I start the analysis of the data collected, giving you the opportunity to withdraw your participation in case you wish to do so.

What are the possible advantages or benefits of taking part?

You will not receive any direct personal benefits from participating but I will provide you with a summary of the findings. In addition, this project will inform decision makers that are involved in the implementation process of the SWS and allow for the prioritisation of their actions to minimize the impact of challenges in the implementation process.

Will my data be kept confidential?

The information you provide will be treated confidentially, and all comments and responses are anonymous. As required by the University of Portsmouth, all research data (interview responses and analysis) will be stored in a password protected electronic file at University of Portsmouth for a minimum period of ten years before being destroyed. Control of access to the data is determined by University of Portsmouth data access protocols, and only members of the research team will have access to the data. If you have any general queries about how your data will be processed, please contact the University's Data Protection Officer, Samantha Hill, using any of the following contact details: Samantha Hill, 023 9284 3642 or information.matters@port.ac.uk University House, Winston Churchill Avenue, Portsmouth, Hampshire,

PO1 2UP, UK

What will happen if I don't want to carry on with the study?

As a volunteer you can stop any participation at any time or withdraw from the study at any time until the analysis stage begins without giving a reason if you do not wish to. If you do withdraw from a study after some data have been collected, the data collected can be destroyed and not included in the study if you wish so. Once the data has been analysed and the research completed, it will not be possible for you to withdraw your data from the study.

What if there is a problem?

You have the right to lodge a complaint about the use of your personal data to first, my supervisors Dr Jana Ries jana.ries@port.ac.uk and Professor Mark Xu mark.xu@port.ac.uk, then the Dean of Faculty if still dissatisfied and finally the University Complaints and Data Protection Officer if still dissatisfied with the response. Should you require any additional information on the project, or would like to discuss your participation, please do not hesitate to contact either myself up880550@myport.ac.uk or my supervisors Dr Jana Ries jana.ries@port.ac.uk and Professor Mark Xu mark.xu@port.ac.uk.

If your concern or complaint is not resolved by the researcher or their supervisor, you should contact the Head of Department:

The Head of Department

Mark Xu Department / School of...

023 9284 [xxxx](#)

University of Portsmouth

xxxx.xxxx@port.ac.uk

Portsmouth

PO1 [XXX](#)

If the complaint remains unresolved, please contact:

The University Complaints Officer 023 9284 3642 complaintsadvice@port.ac.uk

Who is funding the research?

This research is self-funded.

Who has reviewed the study?

Research involving human participants, is reviewed by an ethics committee to ensure that the dignity and well-being of participants is respected. This study has been reviewed by the [xxxxx Faculty Ethics Committee](#) and been given favourable ethical opinion.

Thank you

Thank you for taking time to read this information sheet and for considering volunteering for this research.

Appendix 4: 1-Invitation to participate in research project

Dear Sir/Madam

I am a research student at the University of Portsmouth, United Kingdom. I am currently undertaking a doctoral study entitled an evaluation model for implementing a Single Window System (SWS) in the port of Abidjan (Côte D'Ivoire).

The study aims to identify the critical factors that influence the implementation of Single Window System in the port of Abidjan (Côte D'Ivoire) within the context of developing countries.

I would greatly appreciate your participation in this study. You will be interviewed online approximately for 40 minutes, using google meet or similar software. There is no personally identifiable information to be collected and your participation is voluntary. All answers to the survey will be kept in strict confidence by following the ethics protocol of the University of Portsmouth. The data will be used solely for this research purpose. The University of Portsmouth Ethics Committee has granted ethical approval BAL/xxxxxx to this research project.

If you agree to participate, please send an acceptance email to up880550@myport.ac.uk indicating your preferred time and date for the interview. Should you require any additional information on the project, or would like to discuss your participation, please do not hesitate to contact either myself up880550@myport.ac.uk or my supervisors Dr Jana Ries jana.ries@port.ac.uk and Professor Mark Xu mark.xu@port.ac.uk.

Thank you for your participation in this research project.

Thank you for your anticipated cooperation.

Yours sincerely

Dago Alain Gohomene, Bsc (Hons), Msc, Mphil

PhD Researcher, University of Portsmouth

Appendix 5: Interview protocol

Section A: Profile questions

1. What is your position?					
Director		Manager Mid level		Team leader	
Manager High level		Manager Low level		Employee	
1.1 What department do you work in?					
IT department		Other (Could you give more details)			

2. What age category do you fall into?					
18-24		35-44		55-64	
25-34		45-54		65+	

3. How long did you work at that level?					
<=5years		>5years<=10 years		>10 years	
4. How long have your organisation been participating in SWS?					

Section B: Single Window System (SWS) characteristics.

1-Benefits

In your opinion, what are the benefits your organisation/department can gain through the implementation of the SWS? How important is the impact of these benefits?

2-Critical factors influencing SWS implementation

Question 1: Top management support

1.1 From your perspective, do you think “**Lack of top management support, decisionmaking structure and management style**” have influenced the implementation process of the SWS in your department/organisation? How?

1.2 Please what in your opinion is the level of criticality of the factor described above for your department/organisation, with regards to its negative influence in the implementation process of the SWS for each of the five implementation stages as described by the UNECE.

1.3 In your opinion, how feasible is it to overcome the factor mentioned above during the implementation process of the SWS in your department/organisation?

Question 2: (Complexity of the SWS)

2.1 From your perspective do you think the “**Complexity in understanding the processes and systems among the employees**” has influenced the implementation process of the SWS in your department/organisation? How?

2.2 Please what in your opinion is the level of criticality of the factor described above for your department/organisation, with regards to its negative influence in the implementation process of the SWS for each of the five implementation stages as described by the UNECE.

2.3 In your opinion, how feasible is it to overcome the factor mentioned above during the implementation process of the SWS in your department/organisation?

Question 3: Education and training costs (Skills, capacities building & learning)

3.1 From your perspective do you think, “**Education and training costs for the employees**” have influenced the implementation process of the SWS in your department/Organisation?

How?

3.2 Please what in your opinion is the level of criticality of the factor described above for your department/organisation, with regards to its negative influence in the implementation process of the SWS for each of the five implementation stages as described by the UNECE.

3.3 -In your opinion, how feasible is it to overcome the factor mentioned above during the implementation process of the SWS in your department/organisation?

Question 4: ICT 'infrastructure and Software cost (e-readiness & Telecom equipment)

4.1 From your perspective do you think, “**ICT 'infrastructure and Software costs (e-readiness & Telecom equipment)**” have influenced the implementation process of the SWS in your department/organisation? How?

4.2 Please what in your opinion is the level of criticality of the factor described above for your department/organisation, with regards to its negative influence in the implementation process of the SWS for each of the five implementation stages as described by the UNECE.

4.3 In your opinion, how feasible is it to overcome the factor mentioned above during the implementation process of the SWS in your department/organisation?

Question 5: (Resistance to change)

5.1 To what extent do you think are people resistant **to change** when it comes to implementing the SWS?

5.2 Please what in your opinion is the level of criticality of the factor described above for your department/organisation, with regards to its negative influence in the implementation process of the SWS for each of the five implementation stages as described by the UNECE.

5.3 In your opinion, how feasible is it to overcome the factor mentioned above during the implementation process of the SWS in your department/organisation?

Question 6: (Lack of Political will and legislative support)

6.1 In your views, has “**Lack of Political will and legislative support**” influenced the implementation of SWS services within your department/organisation? How?

6.2 Please what in your opinion is the level of criticality of the factor described above for your department/organisation, with regards to its negative influence in the implementation process of the SWS for each of the five implementation stages as described by the UNECE.

6.3 In your opinion, how feasible is it to overcome the factor mentioned above during the implementation process of the SWS in your department/organisation?

Question 7: **Lack of Partnership, collaboration, and trust among stakeholders.**

7.1 In general, how do you describe the relationship among the different stakeholders? Do you think “**Lack of Partnership, collaboration and trust among stakeholders.**” is affecting the implementation of SWS services within your department/organisation?

7.2 Please what in your opinion is the level of criticality of the factor described above for your department/organisation, with regards to its negative influence in the implementation process of the SWS for each of the five implementation stages as described by the UNECE.

7.3-In your opinion, how feasible is it to overcome the factor mentioned above during the implementation process of the SWS in your department/organisation?

Question 8: (Security and Privacy for the Department/organisation)

8.1 What are the risk in term of **Security and Privacy for your organisation/department** to participate in the implementation of the SWS?

8.2 Please what in your opinion is the level of criticality of the factor described above for your department/organisation, with regards to its negative influence in the implementation process of the SWS for each of the five implementation stages as described by the UNECE.

8.3 In your opinion, how feasible is it to overcome the factor mentioned above during the implementation process of the SWS in your department/organisation?

Question 9: (Leading Agency)

9.1 In your view, has the “**leading agency**” effectively played its role in the implementation process of the SWS? How?

9.2 Please what in your opinion is the level of criticality of the factor described above for your department/organisation, with regards to its negative influence in the implementation process of the SWS for each of the five implementation stages as described by the UNECE.

9.3 In your opinion, how feasible is it to overcome the factor mentioned above during the implementation process of the SWS in your department/organisation?

Question 10: Other Critical Factors

What other critical factors do you think influence the implementation process of the SWS?

Question 11: (Most influential actors)

In your opinion, what are the actors you believe mostly influence the implementation process of the SWS? What are their main activities throughout the process?

Question 12: Goals/ Objectives:

What stage did you reach in the implementation process of the SWS and where was it planned to be?

Question 13: (feasibility factor)

What are the reasons for not achieving your goals, and how do you intend to reach where you wanted to be by targeted date in the implementation process of the SWS?

Appendix 6: Stakeholders involve in the SWS implementation in the Port of Abidjan

Participant (P)	Stakeholders/Organisations		Role
P1	(Org 1)	SWS Subject matter expert	Somebody who has deep knowledge of the functionality of the Ivorian SWS, with years of experience in the field.
P2	(Org 2)	Port Authority of Abidjan (PAA)	Ports Authority of Abidjan (PAA) acts both as a regulator of the port and a service provider. PAA is a public institution of industrial and commercial nature, in charge of operating, managing and promoting the port facilities in Abidjan, Treichville.
P3	(Org 3)	Government body aligned to tax collection on goods coming into and leaving Côte D'Ivoire.	Org 3 is responsible for the assessment, charge and collection of customs and excise duties. It applies its stamp on certificates of origin issued by the ministry of commerce.

P4	(Org 4)	Government body aligned to facilitating trade for importers and exporters	Org 4 is a council of cargo owners, i.e., an organization which represents and protects the interests of importers and exporters, transport services users, in connection with the transport of their goods.
P5	(Org 5)	Government body aligned to maritime affairs.	Org 5 ensure sustainable safe, secure, clean and efficient water transport for the benefit of stakeholders through effective regulation, coordination and oversight of maritime affairs. They receive the Cargo Manifest sent by the Shipping Agent through the SWS.

P6	(Org 6)	Government body aligned to trade.	Org 6 is responsible for the implementation and monitoring of the Government's policy on Trade, and SMEs promotion. It handles the issue of certificates of origin. Also it is the lead agency in the implementation of the SWS.
P7	(Org 7)	Government body aligned to Agriculture	Org 7 controls entry of seeds and plant material (phyto-sanitary) into Côte D'Ivoire to protect local agriculture. It also issues phytosanitary certificates for plant exports.
P8	(Org 8)	Government body implementing the SWS.	Org 8 is in charge of implementing the Ivorian SWS in the port of Abidjan.

P9	(Org 9)	Shipping Agent	The shipping agent acts as a representative of the owner of the ship and carries out all essential duties and obligations required by the crew of the ship. He transmit the Cargo Manifest to the Port authorities, Maritime authorities and the Customs. He reports ships' arrival and departure to the port authorities.
P10	(Org 10)	Clearing & Forwarding Agents	The freight forwarder oversees the entire process of cargo movement, organizing the most suitable port schedules and negotiating the best rates available on the market.
P11	(Org 11)	Importers & Exporters	Export or Import finished and semifinished goods for local consumption, raw material for manufacturing.
P12	(Org 12)	Stevedore company	It is an occupation, which involves the cargo operations i.e. loading and unloading of cargoes on ships. It also includes the other various dockside functions
P13	(Org 13)	Commercial bank	-Primary functions include accepting deposits, granting loans, advances, cash, credit, overdraft and discounting of bills. - Secondary functions include issuing letter of credit, undertaking safe custody of valuables, providing consumer finance, educational loans, etc.
P14	(Org 14)	Insurance company	They provide insurance cover that relates to goods that are transported to and from Côte D'Ivoire through the port of Abidjan.

Appendix 7: Code Book

Sub-category	Code	Data extract	N
ICT Infrastructure	Unstable internet	<p>“In fact, the capacity of internet in the country does not guaranty a stable internet.”(P2)</p> <p>“Hum the internet can be very slow sometime or not available at all.”(P3)</p> <p>“On top of that the internet can be very slow sometime or even unavailable.”(P4)</p> <p>“the internet can be very slow sometime or even unavailable”(P5)</p> <p>“since the beginning of the implementation of the SWS in 2014, the internet has not been very stable.”(P6)</p> <p>“In fact, the internet is to slow often. Sometime it is completely off.”(P9)</p> <p>“In fact, look for instance the internet, very often it is slow. Hum... sometime it goes completely off”(P10)</p> <p>“In fact, the Internet can be slow sometime. Hum a part from that , I do not see any other challenge.”(P13)</p>	9
		<p>“In other words the internet is not reliable.”(P14)</p>	

	Lack of computer literacy and e-readiness	“we have challenges using it because the majority of us (Importer/Exporters) are not computer literate and we are not eready.”(P11)	1
	Complex SWS	“After a blackout or an internet interruption, any previous work get duplicated, which sometimes lead to the payment of penalties”(P9) “In fact, when it come to processing formalities with the customs it is easier to use the Customs IT system (ASYCUDA) than the SWS.”(P10)	2
	Software incompatibility	“there was an incompatibility between the software of port IT system and the SWS platform.”(P2)	1
Top management support	Lack of top management support	“The lack of top management support was very critical for the main stakeholders.” (P1) “At the beginning of the SWS implementation process the port authorities did not support.” (P2)	4

		<p>“The Customs management team initially did not support the SWS implementation project because we saw our prerogatives being taken away from us through this project.” (P3)</p> <p>“The management team was very reluctant to join the SWS project for various reasons.” (P4)</p>	
Change management	Resistance to change from personnel	<p>“Private organizations personnel resisted change because through the digitization of procedures they saw a threat of staff reduction within them.”(P1)</p> <p>“Some of the personnel of the port of Abidjan oppose the idea of the SWS, because of fear of losing their jobs.” (P2)</p> <p>“In fact, most customs did not agree with the idea of a 100% paperless system where we don’t get to meet the client and don’t get to check physically documents related to import and export.” (P3)</p>	6

		<p>“Hum....in fact, the implementation of the SWS did not come as a good news for the personnel at the beginning of the project.”(P4)</p> <p>“the personnel who wanted to carry on working with the old system (ASYCUDA) that did not require internet.”(P9)</p> <p>“Freight forwarders personnel resisted vividly the implementation of the SWS for divers reasons in the early days.”(P10)</p> <p>“The high level of computer illiteracy among us and our lack of e-readiness lead to some resistance at the early stage”(P11)</p> <p>“Private organizations personnel resisted change because through the digitization of procedures they saw a threat of staff reduction within them.”(P1)</p>	
Financial resources	Cost of training & ICT equipment acquisition	<p>“For instance new computers had to be bought and instalment to be made to have the internet connection. And hum you know hum the computers,</p>	1
		software and other related gadgets are not always cheap.”(P11)	

Government support	<p>Lack of strong political will</p> <p>“Finally, a strong political will is needed to get the top managers to fully embrace the project.” (P1)</p> <p>“Strong political will is needed to help the lead agency achieve all its goals.” (P2)</p> <p>“Strong political will and legislative support” that is what we need now to facilitate the full dematerialisation of the SWS.”(P3)</p> <p>“At the same time we encourage the lead agency to do more to obtain a full paperless SWS.”(P4)</p> <p>“strong political will is needed to help the lead agency achieve all its goals”(P5)</p> <p>“We still need more backing from the government to compel the rebellious stakeholders to abide fully by the law through a full dematerialisation of their system.”(P6)</p> <p>“We encourage the government to speed up the process to ensure that all</p>	10
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		<p>the laws necessary for the</p> <p>implementation of a 100% paperless system emerge”(P8)</p> <p>“We will say it again, a strong political will is needed to lift all the obstacles for a full paperless SWS.”(P9)</p> <p>“it will take a strong political will to ensure that all the laws necessary for the implementation of a 100% paperless system emerge, that they are promulgated and effectively implemented by the various stakeholders.”(P10)</p> <p>“The lead agency and the government are not taking strong measures to compel some public stakeholders to comply fully with the principles of the SWS.”(P11)</p>	
Legal Framework	Inadequate framework legal	<p>“Despite the progress made since 2013, we have not yet reach a full paperless SWS because we don’t have all the regulation in place to accompany digitalisation.” (P1)</p>	5

“Up till now the law authorising electronic signature has not been promulgated.” (P3)

“we have not yet reach a full paperless SWS because we don’t have all the regulation in place to accompany digitalisation.”(P6) “Also the non-existence of some laws such as the law regarding the electronic signature have caused a delay in the implementation process of the SWS.”(P8)

“Finally, the law legalising the electronic signature have not been promulgated yet, which delay the dematerialisation of some process.”(P10)

Lead agency	Insufficient inclusion	clarity &	<p>“Stakeholders saw the integration into the GUCE platform as a process that would lead them to abandon their digitalization project.” (P1)</p> <p>“misunderstanding between the port authority and the implementing company.” (P2)</p>	6
			<p>“we thought we would have to abandon our IT system by integrating the SWS platform.” (P4)</p> <p>“This issue can be solved by creating an inter-ministerial entity for the implementation and monitoring of the SWS.”(P9)</p> <p>“This issue could be solved by creating an inter-ministerial entity for the implementation and monitoring of the GUCE.”(P10)</p> <p>“there has been an inadequate inclusion of traders (Importers/Exporters) into the project”(P11)</p>	

Partnership & collaboration among stakeholders	Lack or insufficient collaboration & trust among stakeholders	<p>“It was a big problem getting all the stakeholders to trust each other and collaborate smoothly for the implementation of the SWS.”(P1)</p> <p>“The reluctance to collaborate was due to the fact that the PAA already had its computer system which we felt we would have to abandon by integrating the SWS platform.”(P2)</p>	8
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“Well I can admit, at the beginning of the SWS implementation, the

Customs did not collaborate, as it should with other stakeholders.” (P3)

“At the beginning of the

implementation of the SWS, we were not willing to collaborate specially

with the implementing company.”(P4)

“Unfortunately, not all the stakeholders were willing to

collaborate with us especially the big players namely : the customs, the port authorities and OIC.” (P8)

“The lack of collaboration among stakeholders was very obvious at the beginning.”(P9)

“In fact, because some stakeholders were not willing to dematerialise fully their process they were very difficult to work with.”(P10)

“At the beginning, there was a serious problem of collaboration and trust among the stakeholders.”(P11)

<p>Security and privacy</p>	<p>Fear of security & privacy</p>	<p>the various stakeholders were reluctant to join the project because of their concern of being attacked by viruses, hackers or losing data.(P1)</p> <p>the Port of Abidjan did not want to expose itself to the risk of data theft. (P2)</p> <p>“You see...hum our biggest fear at the beginning of the project was to have our data stolen by hackers, or even have the SWS blocked by hackers or virus.” (P3)</p> <p>“The risks are significant especially since the SWS is hosted by Webfontaine, which alone knows the level of security of its software.”(P9)</p>	<p>4</p>
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Country risk	Political Instability	<p>“It happens that when the government changes or some directors change in public administrations, it halt or slowdown the implementation process.” (P1)</p> <p>“we already had a single window system in the port that was stopped by a new government” (P2)</p>	4
		<p>“Finally our political crisis also influence the implementation process system sometimes.” (P3)</p> <p>“political instability has been affecting, the implementation of the single window system in Côte D'Ivoire.”(P11)</p>	

	Power cut	<p>“we can mention the electricity problem, which has become serious recently.” (P3)</p> <p>“very recently power cuts have been a significant issue.”(P7)</p> <p>“Again very recently power cut has become a problem”(P10)</p> <p>“In addition to that we are now having power cut issues”(P11) “we can add the electricity issue that is very recent”(P12)</p>	5
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Risks related to SWS implementation in the port of Abidjan

Sub-category	Code	Data extract	
ICT (Infrastructure & Skills)	-Dependence on foreign technical know-how	now we heavily rely on foreign know-how for the technology, the IT experts (P2)	1
Organisational	Tech skills gap	<p>“Hum.you know, talking about the tech skills gap, hum recently one of our best IT experts were recruited by the implementing company. There are not many like him on the market.” (P2)</p>	1

	Technological unemployment	<p>“If we start receiving the Manifest directly from the SWS to our IT system, all the 100 employees will lose their jobs or be relocated.” (P2)</p> <p>“Hum...you see one of the causes of resistance from the personnel were also the fear to lose their job because of dematerialisation of the process.” (P9)</p>	2
Financial resources	Sustainability	Also, the other factor we can consider as a risk is the sustainability of the system that is not guaranty. (P2)	1

Other factors related to SWS implementation in the port of Abidjan

Category	Code	Data extract
Stakeholders process status	Process fully paperless	<p>The module dedicated to the OIC is fully operational. At this stage we can say that we have achieved our goal 100%. (P4)</p> <p>Our immediate goal was to obtain online trustworthy information from some stakeholders through the SWS, which we have achieved. (P6) “The services we are offering are fully paperless through the SWS.” (P13)</p> <p>“Hum right now, we could say that our goal is achieved, in fact the whole process of issuing an insurance certificate is paperless.” (P14)</p>

	Manual or partially paperless process	<p>But unfortunately, the SWS is still not paperless.</p> <p>(P1) it was planned to implement six modules. Only two modules (E-voyage & E-manifest) have been implemented so far. (P2)</p> <p>Hum we could say that today we have achieved 85% of our goals. (P3)</p> <p>“The next goal is to issue the phytosanitary certificate online to stakeholders.” (P7)</p> <p>“We have made a lot of progress, but we have not achieved yet the stage of a full paperless SWS intended.” (P8)</p>
		<p>“At the moment, out of the six modules intended for Port activities, only two are operational.” (P9)</p> <p>“However, the clearing system is not yet fully dematerialised” (P10)</p> <p>“Hum well as I said earlier, the dedicated module (emovement) for stevedore is not yet operational” (P12)</p>

Key stakeholders	Customs & Port authorities	<p>But technically, the Customs and the port authorities have more influence when it comes to implementing a SWS in the Port of Abidjan. (P1)</p> <p>The single Windows system is mostly influenced by the customs and the Port Authority. (P2)</p> <p>The implementation of the SWS in the port of Abidjan is obviously mostly influenced by two actors hum the Customs and the port authority. (P3) it the Customs and the port authorities are really the key players. (P4)</p> <p>“The real big players on the ground are the Customs and the port Authority.” (P5)</p> <p>“Obviously, apart from the Ministry of Commerce, the two main actors are the Customs and the Port authorities. They are more involve in the day-to-day activities on the ground.” (P6)</p> <p>“But the customs and the port authorities are really the most influential actors.” (P9)</p>
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		<p>“The Customs and the port authorities influence the most the implementation process of the SWS in the port” (P10)</p> <p>“The Port Authority and the customs are more influential” (P11)</p> <p>“But we personally interact more with the customs and the port authority.” (P12)</p> <p>“I will say that there are three main factors influencing the most the SWS implementation process, which are: The Ministry of Commerce, the customs, and the Port Authority.” (P13)</p> <p>“The customs and the port authorities are really the key factors that influence the most the SWS.” (P14)</p>	
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Feasibility factors	Solutions challenges	<p>to In fact, among all the solutions, the strong political will could have a quicker and more effective impact on the SWS. (P1)</p> <p>The solution now would be strong political will and an appropriate legal framework. (P2)</p> <p>Strong political will and legislative support” that is what we need now to facilitate the full dematerialisation of the SWS. (P3)</p> <p>We hope to be fully back up by a strong political will and obtain the promulgation of the law on electronic signature and electronic document. (P6)</p>
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		<p>“a strong political will and sufficient legislative support is needed, which will facilitate a full dematerialisation of the SWS.” (P8)</p> <p>“This issue can be solved by creating an interministerial entity for the implementation and monitoring of the SWS.” (P9)</p> <p>“To increase the internet capacity by investing into fibre optic capable and the 5 G network.” (P11)</p> <p>“An inter-ministerial entity will facilitate the inclusion of all stakeholders and solve the misunderstanding issue among the implementing company and stakeholders.” (P11)</p>	
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Appendix 8: Tables showing the categories of the critical factors

Stage 1

		Criticality of factors in the implementation process
	Factors	(Org 3)
1	ICT Infrastructure	Medium
2	Top management support	High
3	Financial resources	Low
4	legal framework	High
5	Lead agency role	Low
6	Change management	High
7	Partnership and collaboration among stakeholders.	Medium
8	Security and privacy	Low
9	Government support	High
10	Country risk	Medium

Stage 2

Criticality of factors in the implementation process					
	Factors	(Org 6)	(Org 7)	(Org 5)	(Org 4)
1	ICT Infrastructure & Skills	Medium	Medium	Low	Low
2	Top management support	Low	Medium	Low	High
3	Financial resources	Low	Low	Low	Low
4	legal framework	Medium	Medium	Low	Low
5	Lead agency role	Low	Medium	Low	Low
6	Change management	Low	Low	Low	Low
7	Partnership and collaboration among stakeholders	Low	Medium	Low	Medium
8	Security and privacy	Low	Medium	Low	Low
9	Political support	Medium	Medium	Low	Low
10	Country risk	Low	High	Medium	Medium

Stage 3

Criticality of factors in the implementation process					
	Factors	PAA	Shipping Agent	Insurance Company	Stevedore Company
1	ICT Infrastructure & Skills	High	Medium	Low	Low
2	Top management support	High	Low	Low	Low
3	Financial resources	Low	Low	Low	Low
4	legal framework	Medium	High	Low	Low
5	Lead agency role	Medium	Low	Low	Low
6	Change management	Medium	Medium	Low	Low
7	Partnership and collaboration among stakeholders.	Medium	Low	Low	Low
8	Security and privacy	High	Medium	Low	Low
9	Political support	Medium	High	Low	Low
10	Country risk	Medium	Medium	Medium	Low

Stage 4

Criticality of factors in the implementation process				
	Factors	Importers & Exporters/Traders	Commercial bank	Clearing & Forwarding Agents
1	ICT Infrastructure & Skills	High	Low	High
2	Top management support	Low	Low	Low
3	Financial resources	Medium	Low	Medium
4	legal framework	High	Low	High
5	Lead agency role	Medium	Low	Medium
6	Change management	Medium	Low	High
7	Partnership and collaboration among stakeholders.	Medium	Low	Medium
8	Security and privacy	Medium	Medium	Medium
9	Political support	High	Low	High
10	Country risk	High	Low	Medium

Stage 5

		Criticality of factors in the implementation process
	Factors	A Regional Information exchange system / GUCE-CI
1	ICT Infrastructure & Skills	High
2	Top management support	Low
3	Financial resources	Low
4	legal framework	High
5	Lead agency role	Medium
6	Change management	Medium
7	Partnership and collaboration among stakeholders.	High
8	Security and privacy	High
9	Government support	High
10	Country risk	Medium

Appendix 9: Respondents' profile

Participant (P)	Position	Years of experience	Length of interview
P1	Independent Expert in SWS.	35	01 : 30 mn
P2	Expert in port information system.	30	01 :30 mn

P3	IT system Manager	28	50 mn
P4	Director of Statistics	25	60 mn
P5	Director of IT department	21	50 mn
P6	Deputy Director of trade	25	50 mn
P7	Director of Plant Protection, Control and Quality	15	50 mn
P8	Business Analyst / Project Manager Port Community System (PCS)	7	1 :30 mn
P9	Shipping department manager	12	60 mn
P10	Clearing & Forwarding Agent	16	1 :30 mn
P11	Business manager	9	60 mn
P12	Director of Operations	15	50 mn

P13	Operations manager	7	40 mn
P14	Manager	5	40 mn

Appendix 10: Research Ethics Review Checklist

FORM UPR16

Please include this completed form as an appendix to your thesis (see the Research Degrees Operational

Handbook for more information



Postgraduate Research Student (PGRS) Information	Student ID:		<div data-bbox="1305 268 1435 424">880550</div>
PGRS Name:	<div data-bbox="524 641 1019 722">Dago Alain Gohomene</div>		
Department:	<div data-bbox="524 866 929 1018">Faculty of Business and Law</div>	First Supervisor:	<div data-bbox="1668 866 1980 948">Dr. Jana Ries</div>

Start Date: (or progression date for Prof Doc students)	October 2018	
Study Mode and Route:	Part-time <input type="checkbox"/> Full-time <input type="checkbox"/>	MPhil <input type="checkbox"/> MD <input type="checkbox"/> PhD <input checked="" type="checkbox"/> Professional Doctorate <input type="checkbox"/>
Title of Thesis:	Evaluating critical factors to the implementation of Single window system (SWS) in The case of Abidjan port – from stakeholders' perspectives	

Thesis Word Count: (excluding ancillary data)	61786
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If you are unsure about any of the following, please contact the local representative on your Faculty Ethics Committee for advice. Please note that it is your responsibility to follow the University's Ethics Policy and any relevant University, academic or professional guidelines in the conduct of your study

Although the Ethics Committee may have given your study a favourable opinion, the final responsibility for the ethical conduct of this work lies with the researcher(s).

UKRIO Finished Research Checklist:

(If you would like to know more about the checklist, please see your Faculty or Departmental Ethics Committee rep or see the online version of the full checklist at: <http://www.ukrio.org/what-we-do/codeof-practice-for-research/>)

a) Have all of your research and findings been reported accurately, honestly and within a **YES** ☒

reasonable time frame? ☐

NO

b) Have all contributions to knowledge been acknowledged? **YES** ☒

☐

NO

c) Have you complied with all agreements relating to intellectual property, publication **YES** ☒

and authorship? ☐

NO

d) Has your research data been retained in a secure and accessible form and will it remain **YES** ☒

so for the required duration? ☐

NO

e) Does your research comply with all legal, ethical, and contractual requirements?

YES ☒

NO ☐

Candidate Statement:

I have considered the ethical dimensions of the above named research project, and have successfully obtained the necessary ethical approval(s)

<p>Ethical review number(s) from Faculty Ethics Committee (or from NRES/SCREC):</p>		<p>BAL/2020/38/GOHOMEN</p> <p>E</p>	
<p>If you have <i>not</i> submitted your work for ethical review, and/or you have answered ‘No’ to one or more of questions a) to e), please explain below why this is so:</p>			
<div></div>			
<div></div>			
			<div></div>

Signed (<i>PGRS</i>):		Date: 30/ 05/22
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UPR16 – A

Appendix 11: favourable ethical opinion

Study Title: An evaluation model for implementing a Single Window System (SWS) in the port of Abidjan (Côte D'Ivoire).

Reference Number: BAL/2020/38/GOHOMENE

Date Resubmitted: 14/02/2021

Thank you for resubmitting your application to the Faculty Ethics Committee and for making the requested changes/ clarifications.

I am pleased to inform you that the Faculty Ethics Committee was content to grant a favourable ethical opinion of the above research on the basis described in the submitted documents listed at Annex A, subject to standard general conditions (*See Annex B*).

Please be aware that due to the current COVID-19 outbreak all face to face data collection has currently been suspended by the University. You will not be able to start face-to-face data collection until this suspension has been lifted.

Please note that the favourable opinion of the Faculty Ethics Committee does not grant permission or approval to undertake the research/ work. Management permission or approval must be obtained from any host organisation, including the University of Portsmouth or supervisor, prior to the start of the study.

Wishing you every success in your research



Peter Scott, Chair of the Faculty of Business and

Law Ethics Committee

Annexes

- Documents reviewed

- After ethical review

ANNEX A Documents reviewed

The documents ethically reviewed for this application

Document	Version	Date
Application form	V1	08/09/2020
Invitation Letter	V1	08/09/2020
Participant Information Sheet(s) (list if necessary)	V1	08/09/2020
Consent Form(s) (list if necessary)	V1	08/09/2020
Questionnaire	V1	08/09/2020

Application form	V2	12/12/2020
Invitation Letter	V2	12/12/2020
Participant Information Sheet(s) (list if necessary)	V2	12/12/2020
Consent Form(s) (list if necessary)	V2	12/12/2020
Questionnaire	V2	12/12/2020
Application form	V3	14/02/2021
Invitation Letter	V3	14/02/2021
Participant Information Sheet(s) (list if necessary)	V3	14/02/2021
Consent Form(s) (list if necessary)	V3	14/02/2021
Questionnaire	V3	14/02/2021

ANNEX B - After ethical review

This Annex sets out important guidance for those with a favourable opinion from a University of Portsmouth Ethics Committee. Please read the guidance carefully. A failure to follow the guidance could lead to the committee reviewing and possibly revoking its opinion on the research.

It is assumed that the work will commence within 1 year of the date of the favourable ethical opinion or the start date stated in the application, whichever is the latest.

The work must not commence until the researcher has obtained any necessary management permissions or approvals – this is particularly pertinent in cases of research hosted by external organisations. The appropriate head of department should be aware of a member of staff's plans.

If it is proposed to extend the duration of the study beyond that stated in the application, the Ethics Committee must be informed.

Any proposed substantial amendments must be submitted to the Ethics Committee for review.

A substantial amendment is any amendment to the terms of the application for ethical review, or to the protocol or other supporting documentation approved by the Committee that is likely to affect to a significant degree:

the safety or physical or mental integrity of participants

the scientific value of the study

the conduct or management of the study.

5.1 A substantial amendment should not be implemented until a favourable ethical opinion has been given by the Committee.

At the end of the work a final report should be submitted to the ethics committee. A template for this can be found on the University Ethics webpage.

Researchers are reminded of the University's commitments as stated in the [Concordat to Support Research Integrity](#) viz:

maintaining the highest standards of rigour and integrity in all aspects of research

ensuring that research is conducted according to appropriate ethical, legal and professional frameworks, obligations and standards

supporting a research environment that is underpinned by a culture of integrity and based on good governance, best practice and support for the development of researchers

using transparent, robust and fair processes to deal with allegations of research misconduct should they arise

working together to strengthen the integrity of research and to reviewing progress regularly and openly.

In ensuring that it meets these commitments the University has adopted the [UKRIO Code of Practice for Research](#). Any breach of this code may be considered as misconduct and may be investigated following the University [Procedure for the Investigation of Allegations of Misconduct in Research](#). Researchers are advised to use the [UKRIO checklist](#) as a simple guide to integrity.

April 2018

Appendix 12: Ivorian SWS features

Implementation of the Single Window Concept in Cote d'Ivoire.

1.1 History

Established since July 2013, Cote d'Ivoire's Single Window is a unique platform for business and transport operators to communicate, share and use standardized information and documents across a single point of entry. The dematerialization of all procedures and documents implemented through this web portal, also allows operators to do all the formalities required in case of import, export, transit and also to complete all clearance formalities for goods. It also integrates billing and electronic payment options with the ability to make bulk payments. GUCE CI has a public space to inform all actors or potential actors of foreign trade on the way forward (information portal) and a private area reserved for trade professionals, who are attributed access accounts to the platform. It brings simplification and standardization of commercial procedures, the speed of commercial operations, the facilitation of exchanges as well as the reduction of costs and the cancellation of several trips for the different actors of foreign trade.

1.2 Presentation

Côte d'Ivoire's SWS for Foreign Trade, is a unique and comprehensive platform. It brings together all the players in commerce, and offers a rich panel of features, such as electronic payment, issuance of certificates by the Technical Ministries, exchange control, the electronic sending of the single manifest including the targeting of the manifest and its bills of lading before the arrival of the ship, the collaborative visit, etc.

GUCE relies on the most advanced technologies connected to a highly secure "National Data Center ", set up by Webb Fontaine.

The GUCE also makes it possible to follow in real time, all the stages of treatment of a commercial transaction. It also facilitates decision-making at the ministry level, with a view to greater facilitation and harmonization of actions. This modernization instrument finally allows the State to deliver better quality services.

1.3 The main modules of GUCE CI

The GUCE portal is accessible through the Internet, progressively regroups all GUCE modules. It is the unique interface between the actors of the trade for the accomplishment of the formalities relating to Foreign Trade. Among other things, it informs economic operators about customs tariffs, codification lists, tariffs, procedures to follow, etc.

1.3.1 Government Executive Vision (GEV)

The GEV is a decision support tool for senior government officials. It allows realtime visualization of a large number of statistics, such as the level of revenue, the trade balance, the processing time of commercial transactions (thus allowing quick action to be taken in case of slowness in operations to reduce deadlines), as well as all data relating to the risk and productivity of the customs offices.

1.3.2 Transaction Tracking Module

It allows economic operators to follow in real time the level of processing of their files both in the GUCE and in the computer systems of GUCE partners (SYDAM, etc.). A notification system alerts the user when necessary. This module offers the importer total transparency in his operations.

1.3.3 Commercial Transaction Management (Domiciliation, FDI and Import Authorization)

It allows the operator to obtain in a single submission through the GUCE the domiciliation of his commercial invoice by his bank and the import authorization issued by the Ministry of Commerce. This module consecrates the merger of the DAI (Early Declaration of Importation) and the FRI (Information Sheet for Importation) into a single document called Import Declaration Form (FDI), which leads to the reduction of the number of documents required for importation. The procedure for entering the ICD in SYDAM has therefore been removed. It should be noted that this procedure is completely dematerialized.

1.3.4 e-Manifest: Electronic Manifest Management

It allows Carriers and Ship Agent¹ to send a single manifest electronically through a single system, the GUCE. Today, Transporters must provide multiple manifests for different entities, resulting in multiple returns. Thanks to this module, GUCE is responsible for sending the single manifest received to all user administrations (Customs, PAA, PASP, Airport, Port Community, etc.). Amendments to the submitted manifest are also made through the GUCE

platform by the operators and are validated by the customs officers as needed. The IT systems of the different partners are updated in real time. This module interconnects Customs with Ports and Airport and will work on more reliable data. It facilitates operations and improves the speed of transactions.

1.3.5 e-Ruling Center: Application for Evaluation and Classification One of the important phases in the customs clearance procedure for goods imported into Côte d'Ivoire is the evaluation and classification of these goods.

This phase leads to the issuance by Customs (or the entity in charge of the evaluation) of a Final Classification and Value Report (RFCV) indicating the values and the tariff positions to be used during customs clearance. Since the advent of the Single Window, RFCV requests are made online using the e-RC module without any operator movement.

1.3.6 Pre-Import Authorizations (API)

It allows operators to obtain online the various authorizations related to their commercial transactions by using the data communicated during the intention. All the Technical Ministries issuing foreign trade licenses use this module. The analysis of the different documents required by the Technical Ministries and the various procedures will significantly reduce the number of documents required for import and export as well as harmonize and simplify the administrative procedures. In addition, the GUCE will track the processing time of different entities to ensure the speed of operations.

1.3.7 Franchises and Exemptions

It allows operators to obtain on-line exemptions granted by the authorized entities.

1.3.8 Exchange Authorization / Foreign Exchange Commitment

GUCE aims to enable the economic operator to carry out all formalities related to foreign trade online, this module allows him to obtain the Exchange Authorization or the Foreign Exchange Commitment to FINEX with the participation of Banks Commercial, all of which are already connected to GUCE. This computerization makes it possible to monitor the speed of operations.

1.3.9 e-PAYMENT: Electronic Payment of Fees and Miscellaneous Fees

Thanks to the development of New Communication Techniques (ICT), the use of modern means of payment (bank cards, electronic wallets, e-Banking, etc.) in commerce has become more and more frequent.

GUCE offers economic operators the opportunity to pay customs duties and taxes as well as other costs related to their other business transactions using these modern means which do not require any travel.

This instant payment, reduces the time of removal of goods. Electronic remittance offers the State a tool for effective control of financial flows.

1.3.10 Centralized and multi-agency risk management module

It allows the risks determined by the customs administration to be combined with those of the Technical Ministries (or any other entity) to target the goods to be inspected. The Technical Ministries will adopt the principle of risk management, which will help to reduce delays by facilitating the work of compliant operators and allowing the different structures to focus on high-risk goods / transactions. This risk management module is based on a reasoning algorithm based on memory.

1.3.11 Collaborative Visit (collaborative inspection and certificates) It allows to coordinate all the physical inspections to operate on the merchandise in order to make it one, common to all administrations. This module makes it possible to significantly reduce the time required for goods to be picked up, because previously it took several days / weeks to gather all the entities in charge of the inspections. In addition, it now becomes possible to track the time required for each entity to perform the inspection and thereby take action quickly in the event of bottlenecks.

2. Process mapping of the Ivorian SWS.

In Cote d'Ivoire, the SWS is operated by an implementing company called GUCE CI (Guichet Unique du Commerce Extérieur de Cote d'Ivoire); And the lead agency is the Ministry of Commerce.

The different activities within the system have been organized into modules. The interconnection between the different modules in the GUCE CI system, shows the different steps to be taken by operators to import or export goods from Cote D'Ivoire through the port of Abidjan. Also, each module corresponds to the type of document to be established to import or export.

The import and export process on the GUCE platform follows four main scheduling of the modules which are:

- Scheduling of modules in the import process via the guce (All Import Modules).
- Scheduling of modules in the import process via the guce (goods without rfcv).
- Scheduling of modules in the import process via the guce (goods without license).
- Scheduling of modules in the export process via the guce.

Hereunder are the four-process mapping corresponding to the scheduling of modules in the import and export process via the SWS.

2.1 Process mapping of the Ivorian SWS for the import of all goods.

SIMULATION 1

Scheduling of the Modules in the Import process via GUCE CI

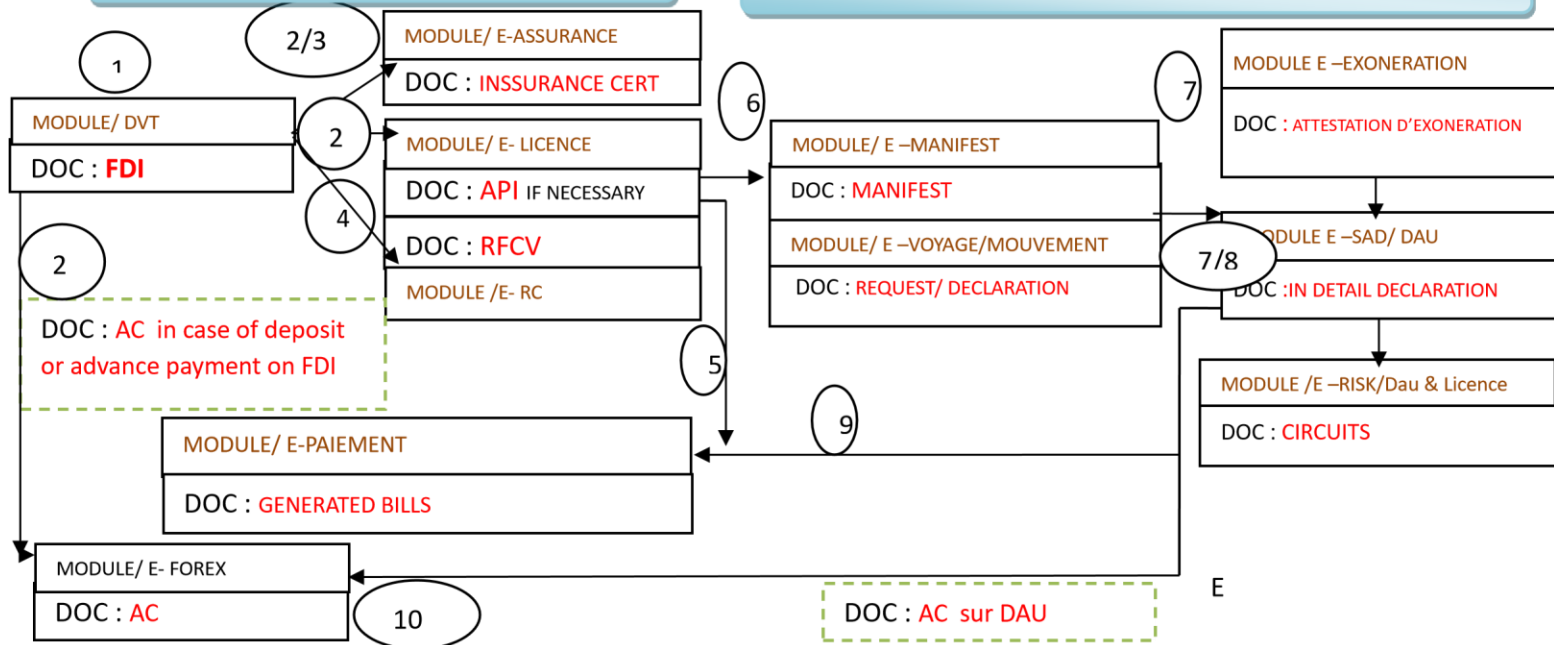
IMPORTER/ FREIGHT FORWARDER

SHIP AGENT

FREIGHT FORWARDER

TRADE MODULES

PORT & CUSTOMS MODULES



2.1.1 STEP 1: DVT - FDI:

document confirming the intention of the importer to import goods: FOB amount of goods greater than or equal to 500,000 CFA francs.

2.1.2 STEP 2: LICENSE (prior import authorization)

- API: the import license applies to goods whose import is subject to the limitation regime

2.1.3 STEP 2/3: e- insurance (insurance certificate): CERTIFICATE OF INSURANCE:

Document officially attesting that the insured person's faculties are covered by a guarantee from store to store or export board on board import. The insurance contract is an agreement by which the insurer undertakes to compensate the insured for claims resulting from transport

adventures, in the manner and within the limits agreed in the contract Today in Côte d'Ivoire , this insurance is made compulsory for all goods imported since the signing of implementing decree n ° 2007-478 of May 16, 2007. Laws 86-485 of July 1, 86 / implementing decree 86486 of July 1, 1986 / n ° 2007- decree 478 of May 16, 2007.

2.1.4 STEP 2 '

Allows the payment of the supplier invoice via the bank for an import operation, in the event of a down payment or prepayment of the invoice / FDI

2.1.5 STEP 4: RFCV (final classification and value report)

RFCV: Imports with an FOB value strictly greater than 1,000,000 f CFA must be subject to a value and classification control.

2.1.6 STEP 5: e-payment ELECTRONIC PAYMENT

Payment of invoices generated by the local commercial transaction

2.1.7 STEP 6: e manifest SUMMARY DECLARATION / travel and movement

It should also be noted that within 72 hours before the arrival of the ship, the consignee enters the manifest in the guce which constitutes a summary declaration. On arrival of the goods.

2.1.8 STEP 7/8: request for exemption if applicable; e Dau or e Sad DETAILED DECLARATION in Customs and. Generated risk management

The detailed declaration is the legal act by which a natural or legal person:

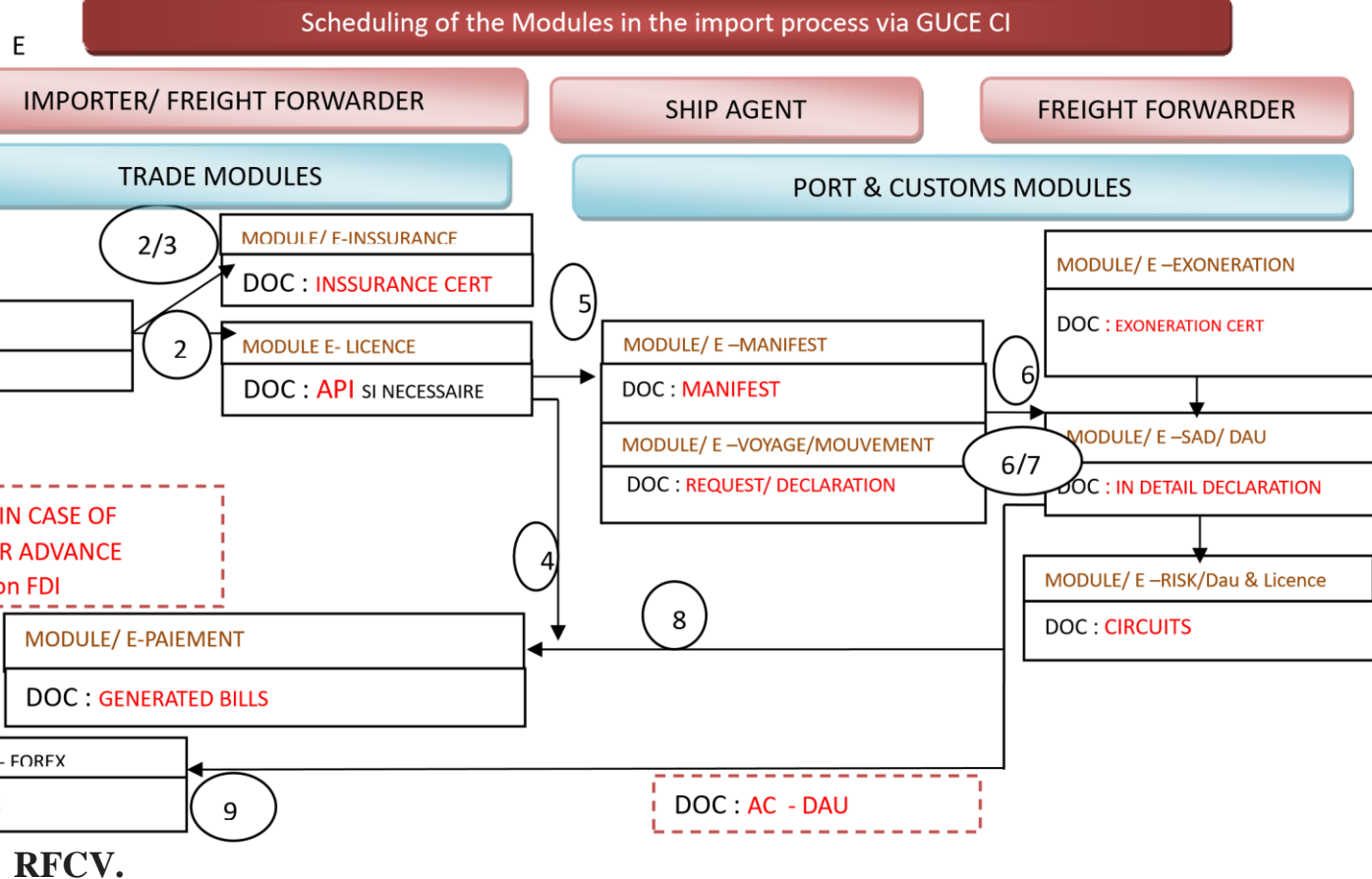
expresses its willingness to assign the goods it imports a final customs procedure (release for consumption, economic procedures, etc.);

undertakes, under legal penalties, to fulfill the obligations arising from this customs procedure (payment of duties and taxes due, export after processing, etc.);

produces all the documents necessary for the identification of the goods and the application of customs or other measures for which the Administration is responsible. These documents constitute, together with the detailed declaration, an indivisible document.

2.2 Process mapping of the Ivorian SWS for the import of goods without

SIMULATION 2



2.2.1 STEP 1 :DVT

FDI: document confirming the intention of the importer to import goods: FOB amount of goods greater than or equal to 500,000 CFA francs.

2.2.2 STEP 2: LICENSE (prior import authorization)

API: the import license applies to goods whose import is subject to the limitation regime.

2.2.3 STEP 2/3: e- insurance (insurance certificate): CERTIFICATE OF INSURANCE:

Document officially attesting that the insured person's faculties are covered by a guarantee from store to store or export board on board import. The insurance contract is an agreement by which the insurer undertakes to compensate the insured for claims resulting from transportation adventures, in the manner and within the limits agreed in the contract Today in Côte d'Ivoire ,

this insurance is made compulsory for all goods imported since the signing of implementing decree n ° 2007-478 of May 16, 2007. Laws 86-485 of July 1, 86 / implementing decree 86-486 of July 1, 1986 / n ° 2007- decree 478 of May 16, 2007.

2.2.4 STEP 2 :

Allows the payment of the supplier invoice via the bank for an import operation, in the event of a down payment or prepayment of the invoice / FDI.

2.2.5 STEP 4: e-payment ELECTRONIC PAYMENT: Payment of invoices generated by the commercial

transaction locally.

2.2.6 STEP 5: e manifest SUMMARY DECLARATION / travel and movement

It should also be noted that within 72 hours before the arrival of the ship, the consignee enters the manifest in the guce which constitutes a summary declaration. On arrival of the goods This step in the procedure can be shown in Figure 2 below. The stages of the procedure upon arrival of the goods. (Summary statement).

2.2.7 STEP 6/7: exemption request if applicable; e Dau or e Sad DETAILED DECLARATION in Customs and. Generated risk management.

The detailed declaration is the legal act by which a natural or legal person;; expresses its desire to assign to the goods that it imports a definitive customs procedure (release for consumption, economic procedures, etc.); undertakes, under legal penalties, to fulfill the obligations arising from this customs procedure (payment of duties and taxes due, export after processing, etc.) produces all the documents necessary for the identification of the goods and for application of customs or other measures for which the Administration is responsible. These documents constitute, together with the detailed declaration, an indivisible document

2.2.8 STEP 8: PAYMENT OF LOCAL FEES: allows the payment of local fees (insurance premium fees related to the license ect)

2.2.9 STEP 9: EXCHANGE AUTHORIZATION: Allows the payment of the supplier invoice via the bank for an import operation.

2.3 Process mapping of the Ivorian SWS for the import of goods without License.

2.3.1 STEP 1: DVT

FDI: document confirming the intention of the importer to import goods: FOB amount of goods greater than or equal to 500,000 CFA francs.

2.3.2 STEP 2: e-insurance (insurance certificate): CERTIFICATE OF INSURANCE:

Document officially certifying that the faculties of the insured are covered by a guarantee of store to store or edge export on board import. The insurance contract is an agreement by which the insurer undertakes to indemnify the insured against claims resulting from the adventures in the transport, in the manner and within the limits agreed in the contract Today in Ivory Coast , this insurance is made compulsory for all the goods imported since the signing of the decree of application n ° 2007-478 of May 16th, 2007. Laws 86-485 of July 1st, 86 / decree of application 86-486 of July 1st, 1986 / n ° 2007- decree 478 of May 16th, 2007.

2.3.3 STEP 2': allows the payment of the supplier invoice via the bank for an import operation, in case of deposit payment or advance payment of the invoice / FDI

2.3.4 STEP 3: RFCV (final classification and value report)

2.3.5 STEP 4: e-payment ELECTRONIC PAYMENT: Payment of invoices generated by the commercial transaction at local level

2.3.6 STEP 5: e manifest SUMMARY DECLARATION / travel and movement

It should also be noted that within 72 hours of the arrival of the vessel, the consignee enters the manifest in the document, which constitutes a summary declaration. At the arrival of the goods

This step of the procedure can be shown in Figure 2 below. The stages of the procedure upon arrival of the goods. (Summary declaration)

**2.3.7 STEP 6/7: request for exemption if applicable; e Dau or e Sad DECLARATION
DETAIL in Customs and. Generic Risk Management.**

The declaration in detail is the legal act by which a natural or legal person: expresses his wish to assign to the goods that he imports a definitive customs regime (release for consumption, economic regimes, etc.); undertakes, under the penalties of law, to perform the obligations arising from this customs procedure (payment of duties and taxes due, export after processing, etc.) produces all the documents necessary for the identification of the goods and for the implementation of customs or other measures for which the Administration is responsible. These documents constitute with the declaration in detail an indivisible document.

2.3.8 STEP 8: PAYMENT OF LOCAL COSTS: allows the payment of local expenses (insurance premium fees related to the license ect)

2.3.9 STEP 9: EXCHANGE AUTHORIZATION: Allows payment of the supplier invoice via the bank for an import operation.

2.4 Process mapping of the Ivorian SWS for Export of goods.

2.4.1 STEP 1: EXPORT COMMERCIAL INVOICE: Export invoice issued by the exporter.

2.4.2 STEP 2: CERTIFICATE Of Origin: request for a certificate of origin Document officially attesting that the faculties were manufactured, extracted from the ground, manufactured in the country of origin.

2.4.3 STEP 3: e-Timber: timber export authorization; It is a document which officially recognizes that the government / or ministry responsible is informed of the proposed export of particular goods and that it has no immediate objection to the export of these goods by the designated importer (approved)

2.4.4 STEP 4/7: e-payment ELECTRONIC PAYMENT: Payment of invoices generated by the commercial transaction locally

2.4.5 STEP 5: e manifest SUMMARY DECLARATION / travel and movement

The consignee enters the manifest in the Guce which constitutes a summary declaration. from the ship.

2.4.6 STEP 6: e Dau or e Sad DETAILED DECLARATION in Customs

The detailed declaration is the legal act by which a natural or legal person;; expresses its desire to assign to the goods that it imports a definitive customs procedure (export of simple exit EX1, etc.); undertakes, under legal penalties, to fulfil the obligations arising from this customs procedure (payment of duties and taxes due, export after processing, etc.) produces all the documents necessary for the identification of the goods and for application of customs or other measures for which the Administration is responsible.

Appendix 13: Table of the papers used in the literature review

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