Digital Customs Transformation for Effective Trade Facilitation and Revenue Collection

Lucienne Abrahams, Mark Burke and Trudi Hartzenberg

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for Effective Trade Facilitation and Revenue Collection

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Abstract

This study explores the evolution towards modernisation of the customs administration function, using a South African case study. Adopting a framework consisting of nine dimensions, the study characterises this process as incremental, leading towards the formation of strategic, digital, dynamic capabilities. These capabilities enable the customs administration to detect non-compliance more effectively and to proactively manage customs to the benefit of traders and the economy.

Keywords: customs modernisation, digital transformation, service innovation, cross-border trade, digital government

JEL codes: L86; N77; O21; O24; O32

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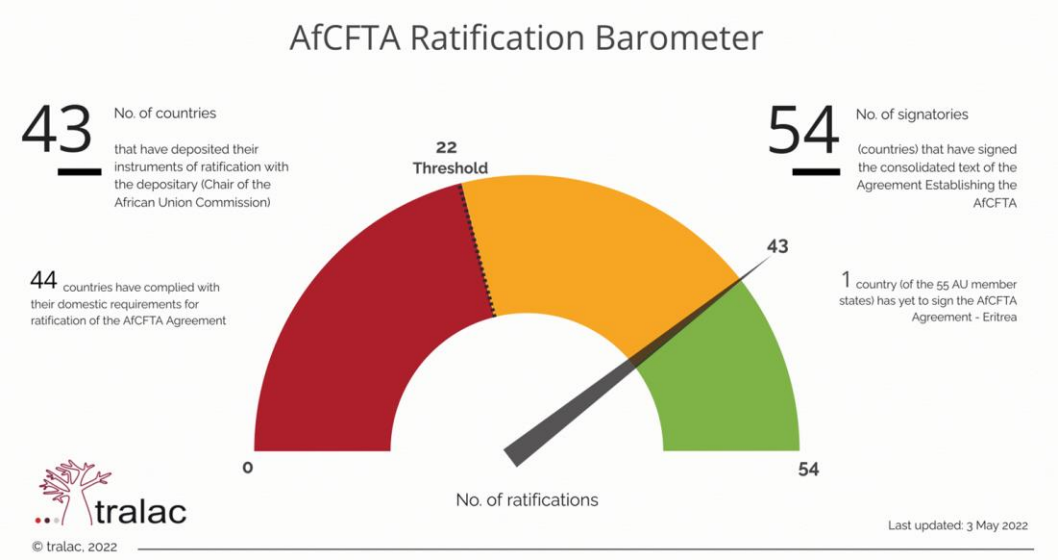
1. Introduction

Customs modernisation presents an evocative case study because it is simultaneously about a transition to digital government services, while it is also a look at digital business transformation, given that the customs administration and management processes create an environment for ease of doing business in the domain of cross-border trade. The purpose of this research was to shed light on the multiple dimensions that make up the complex processes of customs digitalisation in the context of the major shift taking place in the administration of African and global cross-border trade.

1.1 Background

Customs modernisation in South Africa is taking place against the backdrop of the early-stage evolution of the African Continental Free Trade Area (AfCFTA), where 43 countries have deposited their instruments of ratification and 54 countries have signed the text of the Agreement (see Figure 1).

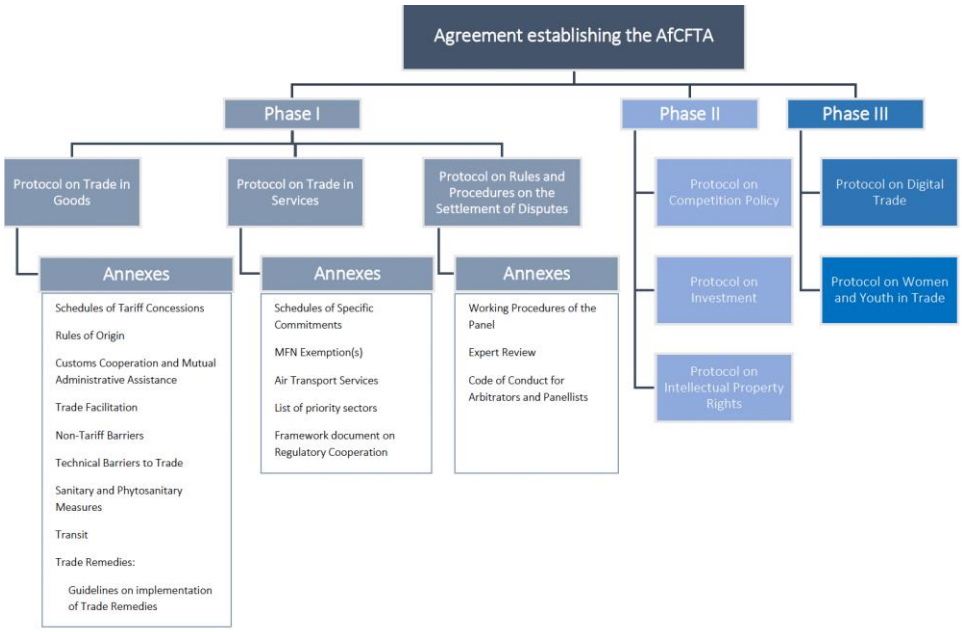
Figure 1: Ratification of and Signatories to the AfCFTA



Source: tralac (2022a)

It is important to understand this South African case study in the context of African and global cross-border trade, since this is the context for trade futures. From the African trade perspective, the legal architecture for the AfCFTA includes eight Protocols and many Annexes, notably the Protocol on Digital Trade and the Annex on Customs Cooperation and Mutual Administrative Assistance (as illustrated in Figure 2).

Figure 2: Protocols of and Annexes to the AfCFTA



Source: tralac (2022b)

1.1.1 Customs modernisation in the context of international trade

Customs administration has traditionally played a pivotal role in international trade as a revenue collection and enforcement agency. Increasingly, the scope of its work extends to restricting illegal trade, facilitating legitimate trade by expediting clearing processes, collecting information on the flow of goods, ensuring compliance with national laws, and ensuring the safety and protection of borders. Having effective and efficient custom administrations and customs procedures contributes to enhanced trade competitiveness and the growth of international trade (WCO 2022). The modernisation of customs procedures is crucial for achieving this.

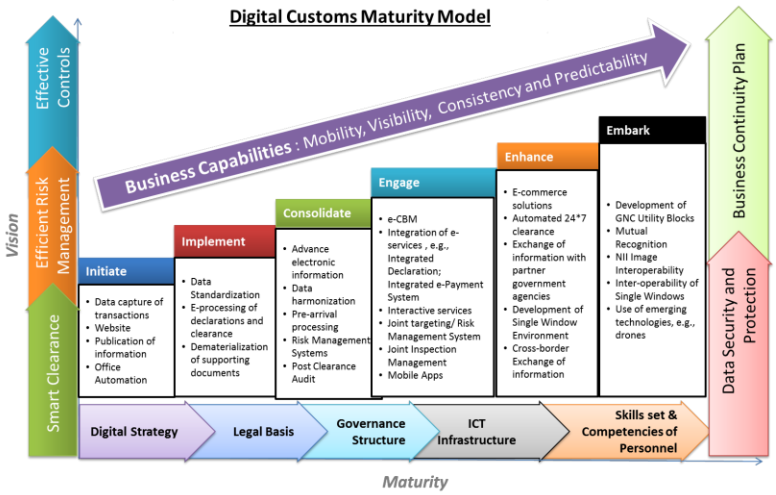
Before the 1960s, customs procedures were entirely manual and paper based. During the 1960s, when the computer became a technology suitable for general use, efforts began to transition from paper-based to paperless customs administration systems. Such efforts came as early as 1961, when the Economic Commission for Europe (UNECE) founded the Working Party on Facilitation of International Trade (WP.4) to "facilitate international trade and transport by promoting rationalization of trade procedures and the effective use for this purpose of electronic or other automatic data processing and transmission" (UNECE – UN/CEFACT 2018:8). This process of *digitisation* merely meant that information captured on paper could now be stored and

accessed electronically; however, the systems storing this information were isolated, with minimal interface between them.

However, this development was crucial for the start of *digitalisation*, which came in the 1980s when countries, South Africa included, turned to the automation of information and communications technology to process and manage the increase in trade volumes. Developed countries created their own automated ICT systems, while many developing countries adopted a system designed by UNCTAD known as the Automated System for Customs Data (ASYCUDA) (Dias 2009). In 2022, more than 101 countries use ASYCUDA. Digitalisation through the use of automated ICT systems allows for individual customs clearance systems to be connected, meaning that data can be exchanged electronically. This exchange may take place within the customs administration, between the customs administrations of different territories, or between the customs system and another ICT system. Such data exchange is instant and highly valuable for its ability to expedite cargo clearance, ensure the accurate reporting of statistics, provide greater integrity and transparency, and improve the effectiveness of monitoring and control mechanisms (Azcárraga et al. 2022).

Countries are at very different stages of digital customs maturity. In the light of this, the World Customs Organization has developed a Digital Customs Maturity Model to provide a phased-in approach to ICT implementation. The model seeks to guide countries that are in their initial phases of customs modernisation by providing a benchmark for their improved use of ICT. It is a useful illustration of the wide spectrum of customs digitalisation (see Figure 3).

Figure 3: Digital Customs Maturity Model



Source: WCO (2018)

1.1.2 The role played by key intergovernmental and multilateral institutions

A number of intergovernmental and multilateral organisations have contributed to shaping the framework conditions for customs modernisation. One of the most influential is the World Customs Organization, which represents 179 customs administrations around the world. The WCO functions as the global centre of customs expertise and is the only inter-governmental organisation with competence in customs matters (WCO n.d.a; WCO n.d.b). The WCO emphasises the importance of applying modern techniques and technologies for improving custom's controls and doing so in an internationally harmonised manner. It has provided support for this process by setting standards for customs modernisation (by creating treaties such as the Revised Kyoto Convention (RKC)), providing a pool of experts to support the implementation of the WTO Agreement on Trade Facilitation, and providing capacity-building programmes and technical support for the implementation of a range of tools and instruments for modernisation.

The World Trade Organization also plays a significant role in the global drive for customs modernisation by setting global rules for expeditiously moving goods across borders, inspired by international best practices. These rules are set out in the Trade Facilitation Agreement (TFA), which contains provisions that promote the modernisation of import and export processes. The TFA has a tailored approach to special and differential treatment that sets out commitments to developing and least-developed countries, based on their capacity to implement the agreement. Like the WCO, there is an important capacity development dimension – the Trade Facilitation Agreement Facility has been established as a technical and financial source of support (WTO 2022).

In Africa, both the African Union and Regional Economic Communities (RECs) have taken on the role of implementing the customs modernisation provisions of the WTO TFA on the continent. The AU has made efforts to implement customs modernisation measures to streamline border trade. This has been in collaboration with WCO, UNCTAD and other development partners, especially in the area of risk analysis. RECs strategies for implementing the TFA modernisation provisions include the development of Regional Customs Modernisation Programmes. Of the regional economic communities in Africa, SACU and the EAC have made the most progress in terms of customs modernisation (Olayiwola 2020).

1.1.3 Recent relevant developments on the African continent

The African continent's economic integration and development agenda has resulted in a number of continental initiatives that provide opportunities for structural transformation, employment, and the development of regional value chains.

These initiatives include:

1. Agenda 2063
2. African Continental Free Trade Agreement (AfCFTA)
3. Programme for the Infrastructure Development of Africa (PIDA)
4. Action Plan for Boosting Intra-African Trade (BIAT)
5. Comprehensive Africa Agriculture Development Programme (CAADP)

As the continent's second largest and most diverse economy, South Africa is well positioned to take a leading role in driving regional development and maximising the benefits that derive from addressing market access and supply-side constraints. One reason for this is related to the composition of the country's intra-African exports. While South Africa's exports to the rest of the world are dominated by commodities, intra-African exports are more intensive in manufactures. Manufactures are more complex products than commodities, and product complexity has a strong positive correlation with income (UNCTAD 2019:12). As a result, intra-African trade is particularly conducive to export diversification. The continent's potential welfare and income gains from expanded intra-African trade will primarily be driven by the implementation of trade facilitation measures and improved customs procedures (World Bank 2020:51).

1.1.4 The role of customs administration in trade development and revenue collection in South Africa

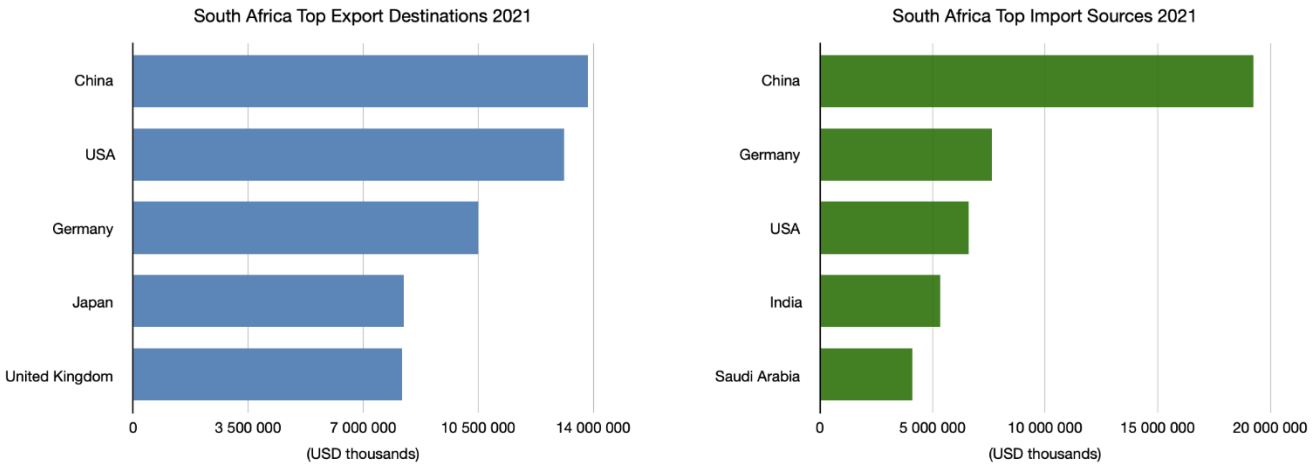
In South Africa, trade policy is used as a primary tool for achieving development objectives. Key to South Africa's trade policy is the strategic use of customs duties to support the development of domestic industries and raise revenues.

Since 2017, South Africa has had a trade surplus with most trading partners, excluding Asia, largely as a result of its large trade deficit with China. Most of South Africa's exports to Asia are resourced-based commodities. Value-added, manufactured products are largely destined for African countries. South Africa's intra-African trade is dominated by Southern Africa as a result of preferential access granted under two regional preferential agreements: the South African Customs Union (SACU) and the South African Development Community (SADC) (International

Trade Centre [ITC] 2022). In 2020, South Africa was the world's largest exporter of platinum (USD 11.9 billion), manganese ore (USD 2.59 billion), chromium ore (USD 1.56 billion), other precious metal products (USD 1.32 billion), and titanium ore (USD 569 million). At the same time, South Africa was the number 38 economy in the world in terms of GDP (current US$), number 36 in total exports, and number 42 in total imports (Observatory of Economic Complexity [OEC] 2022).

With respect to global trade (ITC, 2022), the top exports of South Africa to the world in 2021 were platinum (USD 23.2 billion), iron ore (USD 10.2 billion), gold (USD 7.4 billion), coal (USD 6 billion) and passenger motor vehicles (USD 5.3 billion). The top imports of South Africa were refined petroleum (USD 8.3 billion), commodities (USD 7.6 billion), crude petroleum (USD 5.4 billion), passenger motor vehicles (USD 3.2 billion) and telephones (USD 3.1 billion).

Figure 4: South Africa Export Destinations and Import Sources 2021



Source: ITC (2022)

With respect to Intra-African trade (ITC 2022), South Africa had a large trade surplus with the rest of Africa in 2021. South Africa's imports from Africa were to the value of USD 9.7 billion, while its exports to the rest of Africa were USD 26.2 billion. Intra-African exports account for approximately 21% of South Africa's total exports, while intra-African imports accounted for approximately 10% of the country's total imports. Top exports to Africa are petroleum oils, goods and passenger motor vehicles, iron ore, electrical energy, chromium ore and coal – mostly to Botswana, Mozambique, Namibia, Zimbabwe and Zambia. Top imports from African countries are petroleum oils, gold, mixtures of odoriferous substances (a beverage additive), petroleum gas, electrical energy, and cane or beet sugar. These are imported mostly from Nigeria, Eswatini, Namibia, Mozambique and Botswana (ITC 2022).

Core to South Africa's trade and industrial policy is employment growth. To tackle South Africa's climbing unemployment rate and address the challenges of de-industrialisation, South Africa's Department of Trade, Industry and Competition (DTIC) has focused on a 'developmental trade policy' to encourage and upgrade value-added, labour-absorbing industrial production (Parliamentary Monitoring Group 2014), as set out in the Trade Policy and Strategic Framework (Department of Trade and Industry [DTI] 2010). The policy follows this developmental approach and states unambiguously that trade policy is a tool of industrial policy, designed to support South Africa's industrial development and upgrading, employment growth, and value-added exports. The TPSF identifies areas for future work on 'new generation' trade issues, including trade in services and the trade dimensions of investment, competition policy, intellectual property, government procurement, labour, and the environment. There has been no comprehensive trade policy update since the TPSF.

In March 2021, the Department of Trade, Industry and Competition (DTIC) issued a Trade Policy Statement, which sought to reflect its policy objectives for international trade in the wake of the COVID-19 pandemic and the emerging opportunities from the Agreement on the African Continental Free Trade Area (AfCFTA). While the general approach is consistent with the 2010 framework, reinforcing the role of trade in driving value-added exports and African industrialisation, there are a few new focus areas. The statement recognises the need for a gender-sensitive and gender-responsive trade policy, identifies enhanced environmental sustainability as a trade policy objective, and speaks on the need to respond to the changes that have resulted from digital transformation.

In South Africa, tariffs are a key trade policy instrument used to achieve industrial policy objectives. The DTI's 2010 strategic framework for trade policy details a strategic, case-by-case approach for tariff setting. It lays out that tariff increases are considered for the purpose of granting relief to domestic producers when they are experiencing import pressures. The tariff increase provides them with time to restructure and adjust so that they can be internationally competitive in the long term without tariff support. The strategic approach to tariffs stipulates that tariffs on downstream industries (like automotive and textiles), particularly those that are strategic from an employment or value-addition perspective, may be retained or raised to support the industry's development. A reduction or removal of a tariff on resource-based inputs may be used to lower input costs in labour-intensive industries to increase global competitiveness (Jansen van Rensburg and Sandrey 2016). In addition, the framework's general guidelines stipulate that tariffs on mature upstream input industries (like steel, aluminium or

chemicals) could be reduced or removed to lower the input costs for downstream, employment-creating manufacturing (DTI 2010).

2. Analytical Framework

The digitalisation of customs administration is considered a unique form of technology adoption in government (Kim and Kim 2020). Thus, it is necessary to understand and situate the digitalisation of the customs administration role and function in government in the broader context of the evolution of digital government more generally, and public service digitalisation specifically.

2.1 Relevant Concepts for Customs Modernisation from Digital Government Transitions

Technological innovation, in particular the prolific adoption of digital technologies in society in twenty-first-century society is profoundly influencing, shaping and structuring the ways in which citizens live, work and relate. This has significant implications for governments from two perspectives. Firstly, governments need to adapt how they govern in the face of an increase in the pace and scale of societal change, complexity and uncertainty (Organisation for Economic Cooperation and Development [OECD] 2018). Secondly, governments need to lead their own transformation in order to govern effectively and keep pace with societal change. This has placed increasing pressure on governments to provide better services, engage with citizens, and use data to foster innovation in both the public and private sectors (Sandoval-Almazán et al. 2017).

Interactions between governments and their citizens, whether private citizens or businesses, are based on an exchange of information. Digital technologies, as instruments of data and information acquisition, storage, processing, communication, and executing transactions, are its core technologies and directly affect all of government's functioning (Van de Donk and Snellen 1998). Digital technologies support the internal management, public management and regulation, and delivery of public services by digitising and enabling information services, contact services, transaction services and data transfer services (Bekkers and Homburg 2005). Early theorists conceived of the adoption of technologies in government and the transformative effects thereof as the "informatisation' of government (Van de Donk and Snellen 1998), the virtualisation of the state (Fountain 2001), and digital era governance (DEG) (Dunleavy et al. 2006).

The affordances and capabilities of digital technologies influence the pace and character of the evolving digital government. The period from the 1950s to the 1980s witnessed the introduction of mainframe computers to centralise administrative operations (Dunleavy et al. 2006), and to

support the execution of large-scale numerical processing tasks in government agencies managing large quantities of data, such as tax authorities (Lips 2020). The introduction of the personal computer and server-based network computing in government in the 1980s enabled word processing, calculation, data processing and programming, shifting away from centralised mainframe computing to network computing in a wider range of front-office administrative settings (Dunleavy et al. 2006). The major game changer was the introduction of the Internet, with its World Wide Web system of hyperlinks that enabled access to information and transactions across different departments and tiers of government. The technological convergence of several different digital technologies and media, including IT, telecommunications and broadcasting, rapidly enabled digitisation, integration and interactivity, and the emergence of digital government (Lips 2020). On the basis of the affordances and capabilities of the digital technologies, the adoption of these technologies shifted the focus from technology in government to e-government, and then to digital governance (Janowski 2015). The concept of digital government, introduced by the US National Science Foundation (Scholl, 2008), is defined as "the introduction, application and use of digital technologies and data in government and its external relationships (including citizens, businesses, civil society and international organizations) and the democratic, governmental and managerial implications" (Lips 2020:9).

2.2 Digital Transformation of Government, and Stage Models of Digital Government Evolution and Maturity

The adoption of digital technologies and the associated innovation has the potential to trigger significant change in government, referred to as digital transformation. Such transformation not only involves the adoption and use of digital technologies, but also requires new institutional frameworks and structures that change how governments work (Kim and Kim 2020). As such, digital transformation is defined "as a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies" (Vial 2019:3).

The stage model of digital government evolution introduced by Layne and Lee (2001) has had a significant influence on mapping and characterising its development. The authors propose digital government development as an evolutionary process comprising four stages. In the first stage, governments focus on establishing an online presence through cataloguing, and then move to transaction-based digital government in the second stage by connecting internal systems to online interfaces that allow citizens to transact digitally. This is followed by the third stage, of vertical integration, and the final stage, of horizontal integration, in which different functions and

services at different levels and agencies across government enable one-stop shopping by citizens. Since then, different versions of the stage model have been developed, applied and extended (see Janowski 2015; Siau and Long 2005; West 2005).

The significance of these models lies in their ability to mediate between theories and data, thus providing useful insights on how digital transformation in practice progresses over time (Iannacci et al. 2019). However, stage models have been criticised for not being able to accurately predict developments in digital government, and for being speculative (Coursey and Norris 2008). Furthermore, the stages are not mutually exclusive, do not necessarily follow a sequence, and the assumption of linear progression is problematic when applied to certain technologies, such as artificial intelligence (Sandoval-Almazán and Gil-Garcia 2008). In order to address some of the limitations of existing models that downplay the complexity of digital government, Iannacci et al. (2019) introduce the trajectory-turning point theory, which is premised on a process perspective in which digital government development is characterised by patterns of events called trajectories. The latter are punctuated by radical shifts or turning points.

2.3 Drivers of Digital Transformation Relevant to the Customs Modernisation Context

The adoption of digital technologies in government has been motivated by efforts to realise increased effectiveness and efficiency in operations; to integrate government operations across departments and geographic areas; to customise service delivery; to enhance communication between public agencies and citizens; and to engage the public in decision- and policy-making (Liu and Yuan 2015; West 2005; Wirtz et al. 2017). The realisation of these benefits is influenced by political, social, economic, technological, organisational and legal factors.

Political leadership can influence the pace of technological adoption and innovation in government and is critical in overcoming bureaucratic intransigence, mobilising the resources required and resolving conflict among interest groups (West 2005). Social factors such as an increased demand for improved service delivery by citizens and business, calls for greater transparency and the need for participation in the political process can influence the pace of digital innovation in government (Mergel et al. 2019). Economic factors include the resources and budgets available to support the adoption of digital technologies by government, which requires significant up-front investment (West 2005) with a view to realising the efficiencies and cost-savings that can be leveraged. A range of technological factors are relevant, including demands related to innovation in service delivery through increased capacity for connectivity, and to the processing, analysis and storage of data, as well as the associated challenges of replacing ageing and outdated infrastructure, devices and applications (Lips 2020). Pertinent

organisational factors relate to barriers created by vertical and horizontal fragmentation (Barcevičius et al. 2019) that require the management of a wide range of organisational and cultural changes (Lips 2020). Legal and regulatory factors create the enabling conditions for digital adoption in government, but require changes to law and regulation, particularly in the arena of privacy, data governance and cybersecurity (Barcevičius et al. 2019).

2.3.1 Legal and regulatory foundations

There are three major categories of cross-border trade, namely trade in services, digital trade, and merchandise trade. Digital trade is a broad category of trade, characterised by UNCTAD as all trade that is either digitally ordered or digitally delivered (UNCTAD 2022). Digitally ordered goods and services are any goods or services that are ordered online (e-commerce) but provided in person. Examples are cloud services, SaaS (software as a service), digital marketplaces such as online services, digital video streaming, music streaming, software downloads and gaming. For each of these forms of trade, legal protocols apply at a global and regional level. For digital trade in Africa, new protocols are being designed under the AfCFTA. Furthermore, all categories of trade require strong legal foundations for their operation, including national laws on electronic transactions, laws on cybersecurity and cybercrime, and laws on data protection.

2.3.2 From customer service experience to traders' service experience

Noting the extensive literature on customer service experience in the digital domain, two key points are useful to consider. Enhancing customer experience has benefitted from shifting to digital channels or platforms in many sectors, in particular in banking and financial services, and in home entertainment. In some instances, exclusively online channels, such as municipal service applications or 'apps', have progressively replaced traditional channels such as call centres, even where the new online channels are not yet mature. The customer is generally offered a choice of traditional and digital channels for a transition period, thereby creating redundancy in the system and enabling reasonably extensive testing of the digital customer service experience. Traders are customers of a special type, requiring highly specific types and efficiencies of service, in particular the channels through which to operate in historical geographic markets and in new markets. Digitisation of customs administration can boost the capacity of traders to venture into new markets in nearby or distant geographic regions, if such digitisation increases the ease of trade, lowers the cost of trade and promotes security of cross-border trade.

2.3.3 Deep process automation and optimisation

In many sectors, automating business processes as a key part of digital transformation arises from the increasing realisation that (i) businesses need to transform the nature of their service to address service weaknesses, to improve the service experience, and to extract and generate better quality data about services, and that (ii) new approaches to and forms of service are possible with digital tools and processes, hence the need for deep process automation (DPA) and deep process innovation (DPI). Generally speaking, DPA sees a shift from business process management and enterprise resource planning (ERP) systems, which have tended to focus on a particular aspect of the business, e.g. financial administration, procurement, human resource management or logistics, to platforms that use robotic process automation (RPA) and that host and integrate all data across the business, making it easier to engage in complex data analytics and integrate machine learning forms of analytics (Le Clair 2017). Analytics, in turn, enable continued processes for the optimisation of business processes, since one cycle of optimisation must necessarily lead to another.

2.4 Enablers of Digital Transformation

2.4.1 Digital transformation strategy applied to the customs and cross-border trade environment

Customs administrations are highly complex organisations, which have for too long been held back by overly bureaucratised, inefficient structure and management. Contemporary digital transformation strategy emphasises a few key concepts, including techno-human collaborative models and agile approaches to organisational, process and technology design, all of which are pertinent in the customs environment.

2.4.2 Digital leadership and change management

Leadership is critically important in enabling digital transformation and is characterised by a change orientation and adaptability with a transformative vision and is positively associated with driving innovation performance (Benitez et al. 2022). Digital leadership competencies and attitudes through which managerial actions are directed play a pivotal role in digital transformation, particularly change management activities and promoting participation by all employees (Tangi et al. 2021). More advanced stages of digital transformation are enabled by more democratic, team-based leadership styles, greater alignment with the mission of the organisation, and higher efficacy of the strategic management processes (Porfírio et al. 2021).

Digital leadership, comprising a combination of transformational leadership styles and digital innovation, positively influences digital transformation and has a positive association with organisational agility (AlNuaimi et al. 2021).

2.4.3 Platformisation practices

Shifting a large and complex institution, with many complex business processes, and complex transactions such as international payment settlement processes, into a platform environment is an essential step in 'service modernisation', because platforms offer a few key advantages. Platforms offer the ability to scale rapidly, they result in 'two-sided network effects', meaning that both service providers and users of the platform generate future demand that can be monetised, and they provide easy access to all the channels, applications, forms and information required in one accessible location. Introducing platforms into the business design requires specialised practices, over and above a broad strategic direction. In particular, moving the customs administration operations to platforms requires extensive systems aggregation (linking apparently trivial and disconnected data and other elements) and systems integration (organising and fusing separate sub-systems into a holistic, dynamic system). Such innovation requires the adoption of specific capabilities, models and tools to enable innovation within or beyond existing business models (Coreynen et al. 2020; Kieser 2017; Spieth et al. 2014).

Moving to platforms is one form of business model innovation, and it requires organisations to logically and consciously apply practices that will generate value creation, value delivery and value capture (Hossain 2017; Spieth et al. 2014). Value creation means using identified inputs to build the new or adjusted value chain that will generate value for the customer (in this context traders (importers, exporters), clearing houses, transport and logistics firms, freight forwarders, government agencies responsible for border control, payment settlement agencies, other). Value delivery refers to realising the value proposition, in that new business models are operational and the customers experience the benefits promised. Value capture means the lasting effects and the financial and non-financial benefits realised over time. Each of these distinctive practices must be adopted, understood, shared and learned, since institutions must progressively build their proficiencies to innovate, and to manage and sustain digital innovation. Tongur and Engwall (2014) speak of the need for organisational ambidexterity, which is the combination of optimising and innovating, thus enhancing and transforming business models and service offerings.

2.5 Real Transformation: Moving Away from Path Dependency

2.5.1 Digital ecosystems and applications

The literature on digital ecosystems stresses the system, sub-system and super-system view of digital transformation. For the purposes of this case study, the customs modernisation system includes all parts of government (customs and revenue authorities, port authorities, health authorities and others), traders and receivers of goods and services traded, and the service providers contributing to customs modernisation through digital innovation. The sub-systems refer to each particular component, for example port authorities or traders. The super-systems refer to the multiplicity of customs authorities and their systems and sub-systems, all engaged in trade partnerships and transactions. Creating an applications environment that mobilises all the moving parts at a system, sub-system and super-system level will require deep process automation.

2.5.2 Dynamic capabilities orientation

The dynamic capabilities perspective of organisational change views the "capacity of an organisation to purposefully create, extend or modify its resource base" as a key resource for channelling organisational change (Helfat et al. 2007: 4). It focuses on an organisation's ability to integrate, build and reconfigure internal and external competencies to respond to rapidly changing environments (Teece at al. 1997). Dynamic capabilities are those that enable an organisation to sense and shape opportunities and respond to threats, seize opportunities and transform organisational resources to enhance performance (Katkalo et al. 2010; Teece 2007).

Researchers are increasingly applying a digital capabilities lens to assess how digitalisation influences the development of such capabilities in organisations. In a review of the literature on the state of knowledge on digital transformation, Vial (2019) calls for the use of dynamic capabilities as a theoretical foundation in the study of mechanisms that enable organisations to engage in digital transformation oriented towards strategic renewal by focusing particularly on the role of integrative capabilities and the micro-foundations that assist in understanding and explaining how digital transformation unfolds in practice. Warner and Wäger (2019) argue that the ubiquity of digital technologies changes the nature and purpose of dynamic capabilities in terms of navigating innovation ecosystems, redesigning internal structures and improving digital maturity.

In their study, which focuses on emerging technologies for the integration of industrial machines, Ghosh et al. (2022) identify strategic sensing, rapid prototyping and organisational structure as

the core capabilities for digital sensing and seizing, while business model transformation and cultural transformation were identified as core to digital reconfiguring. Warner and Wäger (2019) found digital scouting and scenario planning to be essential for digital sensing in information-abundant environments characterised by rapid changes. Sensing capabilities in digital ecosystems relate to an increased ability to scan more widely for new opportunities, looking beyond known ecosystem relationships (Linde et al. 2021). Digital seizing capabilities draw the link between strategic agility and business model innovation in the service of strategic renewal (Warner and Wäger 2019). Capabilities related to the reconfiguration of the organisation's resource base concern the renewal of the business model, which triggers wider changes in the organisation's collaborative approach and eventually leads to deeper changes in the organisational culture. It involves adjusting operational processes to respond to new technologies and systems upgrades (Linde et al. 2021), including the development of integration capabilities through data, process and channel integration (Annarelli et al. 2021).

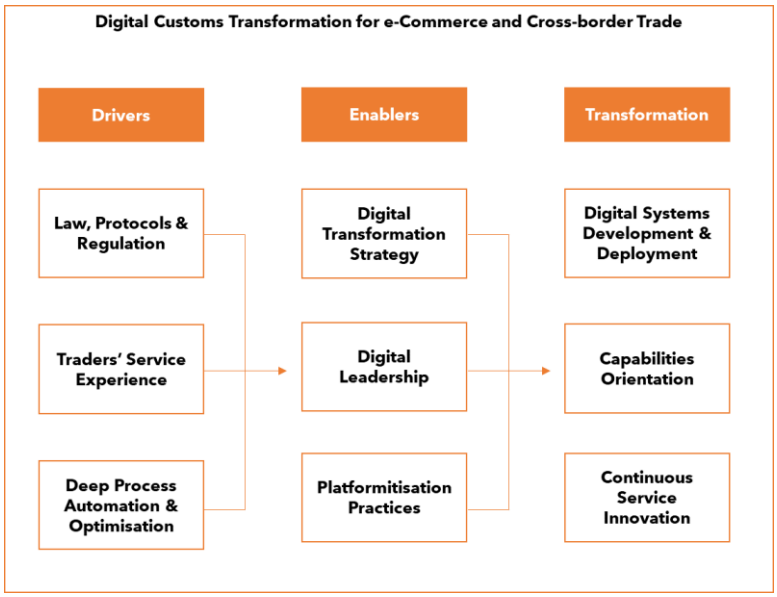
2.5.3 Continuous service orientation

Continuous service innovation is the result or confluence of the eight dimensions discussed above, where one generation of innovative applications and services creates the foundation for the next.

2.5.4 Overarching analytical framework

Based on a literature scan, the nine dimensions sketched out below give us an initial analytical perspective that guides the data extraction and structuring, and the related data analysis.

Figure 5: Analytical Framework for the Digital Transformation of Customs Administration



3. Brief Methodology Statement

A case study methodology was followed with respect to the phenomenon of customs modernisation through digitalisation. Following the logic of Yin (2014), the study commences the investigation in a way that meets one of Yin's two main requirements, namely studying the phenomenon in its real-world context. This context is that inter-African and global cross-border trade is increasingly being shaped by deep digital process automation and deep digital process innovation, often using robotic process automation (Le Clair 2017). However, it does not yet fully address Yin's second requirement, for an in-depth study, which will inform the next iteration of the working paper, in which we will focus on the system and super-system level to explore a wider range of institutional changes and customs digitalisation initiatives across Africa. The ethics clearance, certificate number H22/06/03, was obtained from the University of the Witwatersrand.

4. Insights from the Digital Customs Transformation

The South African customs landscape includes multiple government departments and agencies at the national level, including the Border Management Agency; the Department of Agriculture, Land Reform and Rural Development; the Department of Environmental Affairs; the Department of Health; the Department of Home Affairs; the Department of Trade, Industry and Competition; the International Trade Administration Commission; the National Regulator for Compulsory

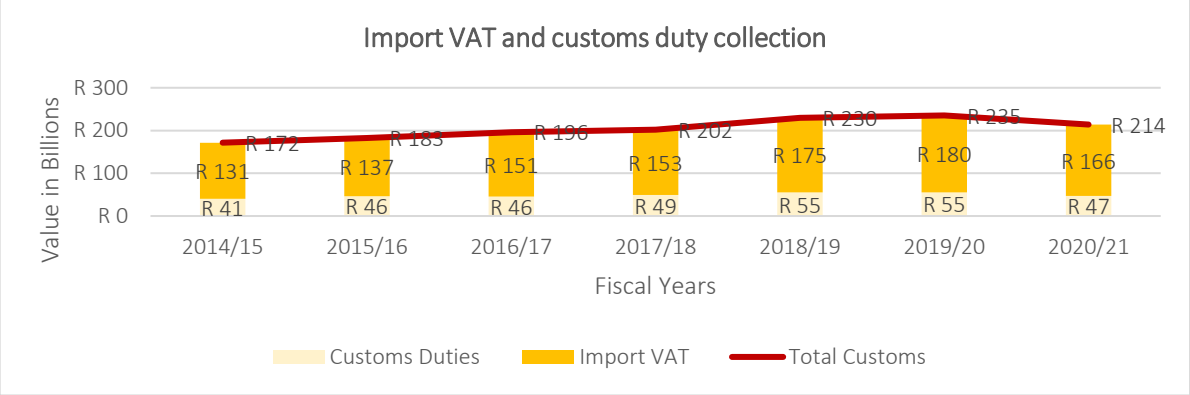
Specifications; the Medicines Control Council; the Plant Inspector; Port Health; the South African Police Service; the South African Revenue Service; and the State Veterinary Service. Many thousands of staff are employed in the customs administration environment.

South Africa seeks to build a smart, contemporary revenue collection service with high integrity, progressively building and administering a tax and customs system based on voluntary compliance and, where appropriate, on responsible and decisive enforcement. The SARS Vision 2024 sets nine strategic objectives. Strategic objectives five and six relate explicitly to the use of digital technologies to expand the use of data to ensure integrity, derive insight and improve outcomes, and to modernise systems to provide streamlined online services (SARS 2021b).

4.1 Descriptive Data on Customs Administration

Customs revenue is calculated at an average R200 billion per annum, over the seven-year period 2014/2015 to 2020/2021, underlining the importance of continuous service improvement.

Figure 6: Customs Revenue Collected 2014/2015 to 2020/2021



Source: Authors' compilation based on SARS annual reports

In the past 25 years, South Africa's tax net revenue collection has grown significantly, from R147.3 billion in 1996/1997 to R1.563 trillion in 2021/2022. This represents a more than 10-fold increase and a compound annual growth rate (CAGR) of 9.9%. In the 2021/2022 financial year, customs duties, comprising duties on imports, specific excise on imports and ad valorem duties on imports, contributed R58 billion to revenue collection (3.7%) (SARS 2022). According to the World Bank, the average time to clear exports through customs in South Africa in 2020 was eight days. This is significantly shorter than the average time for Sub-Saharan Africa, which was 11 days, but longer than the average for upper middle-income countries, which was seven days in 2020 (World Bank 2021).

Table 1: Customs Volumes

	2020/2021	2019/2020	2018/2019
New importers	6 532	9 821	9 934
New exporters	5 122	8 701	8 637
Licensed clearing agents	170	212	147
New accredited clients (AEO launched 2020/21)	14	(Preferred trader) 28	(Preferred trader) 35
Import declarations	2.7 million	3.4 million	3.3 million
Export declarations	2.8 million	3.8 million	3.7 million
Customs inspections	194 000	673 408	629 031
Customs seizures	4 978	5 932	6 828
Post clearance audits	1 343	1 758	2 449

Source: SARS (2021a)

The South African Revenue Service (SARS) has the mandate to administer South Africa's tax system and customs services in terms of SARS Act No. 34 of 1997. According to the Act, the customs authority is established as an organ of state within the public administration, but as an institution outside of the public service, providing it with a significant degree of administrative autonomy, while it carries out its mandate under the policy control of the Ministry of Finance. The customs administration process is complex, situated in a multifaceted policy and regulatory environment. The work of customs administration consists of interactions with a large number of international and domestic stakeholders, multiple channels of communication and information exchange, and is geographically spread out. Furthermore, the delivery of customs administration services takes place through a network of physical infrastructure arrangements, consisting of a command centre with nine national air borders, six railway crossings, nine sea borders, including inland ports, and 53 land borders covering 47 000 kilometres (Ally 2022).

Four core pieces of legislation govern and regulate the customs ecosystem in South Africa, consisting of the Customs Control Act, the Customs Duty Act, the International Trade

Administration Act and the Counterfeit Goods Act. A major revision of the customs and excise legislation was initiated in 2003, culminating in the new Customs Control Act and the Customs and Excise Amendment Acts adopted in 2014 (Lowitt 2019). This legislation is complemented by up to 20 additional pieces of legislation that inform the complex scope of governing and regulating customs administration.

4.1.1 South Africa's customs modernisation and digitalisation journey

The evolution of South Africa's customs administration as we know it today began in the 1980s, before customs administration was a division of SARS.

Table 2: Brief Overview of Customs Digitalisation 1980 to 2022

1980 – 1997	The modernisation journey begins with the introduction of the first automated clearance deceleration, deferred payments and basic risk assessment.
1997	SARS is established in terms of the South African Revenue Service Act, No. 34.
1999	The New Income Tax System (NITS) is introduced – an online system that automated the capturing and assessment of returns.
2001 – 2003	The Siyakha programme is introduced with the aim of making SARS a process-driven, service-oriented organisation. It includes the introduction of the risk-based approach, cargo control, bonded movements, accreditation of clients, automated inventories, new export system, licensing of bonded removers, bond acquittal system, refund system, anti-smuggling teams and post-clearance inspection teams (PCI).
2003 – 2009	This period marks a focus on moving SARS into the 21st century by introducing the Container Security Initiative (CSI), the Detector Dog Unit (DDU), the Customs Border Control Unit (CBCU), and cargo scanners, as well as the adoption of international conventions (RKC, SAFE Framework, Mutual Administrative Assistance (MAA)), joining the Globally Networked Customs (GNC) initiative of the WCO, and the introduction of the Customs Green Paper.
2009 – 2014	This period sees the shift to electronic data interchange (EDI). The integrated declaration system replaces 37 legacy systems. In addition, there is the introduction of the Customs Risk Engine (CRE), the automated inspection process, automated workflows, automated stakeholder communication, mobile field devices, segmented client management and the electronic road manifests (eRFM).
2015 – 2021	The New Customs Act Programme is introduced for implementation of the 2014 Customs Control Act. This period focuses on the reporting of conveyances and goods (RCG), registration, licensing and accreditation (RLA), together with the declaration-processing system (DPS).

2021 – current	Customs modernisation is aligned with SARS Vision 2024, which aims to make SARS a smart, modernised organisation. The Vision is based on nine strategic objectives (SARS, 2021b): 1. Provide clarity and certainty for taxpayers and traders with respect to their obligations 2. Make it easy for taxpayers and traders to comply with their obligations 3. Detect taxpayers and traders who do not comply, and make non-compliance hard and costly 4. Develop a high-performing, diverse, agile, engaged and evolved workforce 5. Increase and expand the use of data within a comprehensive knowledge management framework to ensure integrity, drive insight and improve outcomes 6. Modernise systems to provide digital and streamlined online services 7. Demonstrate effective resource stewardship to ensure efficiency and effectiveness in the delivery of quality outcomes and performance excellence 8. Work with and through stakeholders to improve the tax ecosystem 9. Build public trust and confidence in the tax administration system

Source: Authors' compilation

The digitalisation of the customs administration function in SARS commenced in 1980, similar to many developed country jurisdictions, where tax administration organisations pioneered the introduction of computer systems in government (Dunleavy at al. 2006). The introduction of the CAPE System in 1980 signalled the start of digitalisation, with this distributed system operating at the core customs offices, driven by the need to limit computation errors made by traders on import clearances (Respondents 1 and 3). At this time, the compilation of customs declarations was completely manual and prone to human error. In subsequent years, digitalisation was extended to the processing of duty payments and the duty deferment scheme. The introduction of Compu-Clearing, the first computer bureau, in 1985 enabled clearing agents to compile customs declarations digitally. The first digital clearances were submitted to Customs via a magnetic disc that enabled a customs operator to 'read' the information into the CAPE System which, in turn, minimised the capturing function.

The first risk-based 'selectivity' system for import declarations was introduced in the late 1980s with the aim of minimising the number of physical inspections undertaken at the ports and container depots. The implementation of electronic data interchange (EDI) through the mapping of the goods declaration information into the United Nations Directories for Electronic Data Interchange for Administration, Commerce and Transport (CUSDEC) format and the EDI Gateway, followed by the development of transmission capability for clearing agents and freight forwarders, provided further momentum to the digitalisation efforts. The customs authority began accepting fully digitised clearances in March 2001. The period from 2000 to 2003,

coinciding with the introduction of the Siyakha Programme, established the foundations for transformation though diagnostics, standardisation of baseline processes, and addressing infrastructure requirements (Sinthumele 2022). Several piecemeal developments, including the automation of the export process, partial automation of the processing of refunds/drawbacks, cross-border/transit acquittals and the deployment of the first Customs Cargo Manifest control system, were implemented (Respondent 1).

The first Customs Modernisation Programme (CMP) followed in 2009 and focused primarily on the modernisation and migration of customs clearance to the newly developed Customs Management System (CMS) platform. An important step in the implementation of this programme was the design of a single data model, the South African Customs Data Model (SCDM), and the development of the Customs Procedure Code (CPC) table. This facilitated the migration of all legacy systems to this method and code, which facilitated the tracking of goods while under customs control until release (Respondent 1). Under the first CMP, a shift away from people- and paper-intensive processes towards the use of digital systems and solutions, including the integration of 37 legacy systems, was enabled, side by side with the adoption of automated risk management and the audit approach (Sinthumele 2022). This period represented a fundamental shift towards online taxpayer engagement (Kieswetter 2022) through investment in the building blocks for becoming a data-driven customs administration focused on the greatest possible use of data and technology to automate customs operations (Sinthumele 2022).

A new Customs Modernisation Programme was introduced in 2021 with a focus on the automation of customs land border posts and the implementation of a single window to enable the implementation of the World Trade Organization's Trade Facilitation Agreement and to facilitate cross-border trade under the African Continental Free Trade Area (AfCFTA) (Respondent 1). The modernisation and digitalisation process of the customs administration remains an ongoing initiative, notwithstanding investments over a period of more than forty years. The customs client registration, licensing, declaration, payment and cargo reporting processes have been fully digitalised, while the customs clearance process is yet to be digitalised as part of the end-to-end customs administration value chain (Respondent 1).

The evolution of the digital transformation process that underpins the modernisation of the customs administration function can be characterised as *consistently incremental*, rather than radical. It is based on the logic of substantial initial investments in digital technologies, followed by incremental investment that ensures that solutions meet the needs of the organisation and its stakeholders in the customs administration ecosystem. This logic produces a wave-like pattern

of organisational change and stability, with the introduction of a new solution and its stabilisation in use over time.

> [W]e've been through … several modernisation waves and … we have kind of a very intense focus on modernisation. And then … we kind of go through a stabilisation [period] ... (Respondent 3)

This is not to suggest that incremental investments in digital technology do not produce transformative impacts. Rather, it suggests that a consistently incremental approach is one possible route to producing digital transformation in public sector organisations. The incremental investments in digital technology lay the foundation for transformation as the solutions mature over time.

> … we absolutely want to make that ten times improvement. But it might be in various phases which we find we are much more competent in delivering bite-sized chunks. Quicker delivery to business proved that we've made a success and then build on that as we go on. (Respondent 3)

The distinction between incremental (evolutionary) and radical (transformational) improvements as a consequence of digitalisation and digital transformation is also found in the literature (Gong and Ribiere 2021). Incremental improvements involve step-wise enhancements and continuous process-oriented change, compared to radical improvements involving episodic change with dramatic results, noting that both approaches can lead to the demand for new ways of working, new methods, new cultures and strategies. This apparent dichotomy may be one of perception rather than reality, as is demonstrated by the case of South African customs digitalisation. Incremental improvements in the digitalisation of customs administration, incorporating automation, streamlining of processes, and reengineering through the digitalisation of operational activities, have contributed to new ways of working for the customs authority and its stakeholders. It is thus important to understand digital transformation as multifaceted, with incremental changes in government that "[spread] like waves across different periods, organisational elements, and bureaucratic levels" and eventually can result in transformational change over the long term (Gong et al. 2020, p. 11).

4.1.2 Drivers of digital customs transformation

Law, protocols and regulation

Outdated customs legislative frameworks can serve as a significant non-tariff barrier, hamper revenue collection, and discourage foreign trade and investment (Mikuriya 2005). Modernising

customs legislative frameworks therefore can serve as an important driver of customs modernisation, including digital transformation. The preamble of the *Customs Amendment Act (CAT) 31 of 2014* explicitly acknowledges the need for a new customs legislative framework in response to the technological advances that underpin and enable the contemporary international trade system, as reflected in the modern standards of the Revised Kyoto Convention and related instruments to which South Africa is a signatory. The CAT is intended to serve as a 'platform' for customs modernisation and, through mandatory provisions on the digital submission of communication, advanced cargo reporting and various digital notification requirements throughout the process, thereby aims to establish end-to-end supply chain visibility for the customs authority.

> … the new acts focused quite a lot on the automation of various aspects, … not just the submission of declarations and manifest, but … spontaneous messaging between various supply chain operators, warehouse operators, clearing agents with SARS … (Respondent 1)

The new legislative framework implies the significant digitalisation of customs core and sub-processes. The customs client registration and licensing, as well as cargo reporting, are the only components developed and implemented thus far. Customs clearance was postponed until a later date (Respondent 1). Thus, the full implementation of the new legislative framework is still in process, given the practical operational and financial constraints (Respondent 5) with respect to the systems requirements that need to be put in place by the customs authority (Respondent 4).

The new legislative framework is aimed at bringing the authorising environment in line with the standards set by the World Customs Organization (WTO), particularly the Revised Kyoto Convention adopted by 114 customs administrations in 1999 (Respondent 5). This international instrument is aimed at standardising and harmonising the customs policies and procedures worldwide, and provides a guide and standards for doing so (Mikuriya 2005). The role of international standards has been a crucial driver in customs modernisation and digitalisation in South Africa.

> … we were one of the pioneers with the EDI data models for customs declarations and manifests and so forth … and we've always endeavoured to adopt the WCO principles, guidelines and the standards either in our legislation or our policies and even in the systems domain. (Respondent 1)

The customs modernisation and digitalisation process has been influenced by the technological innovations in the marketplace to a lesser extent that by the rationale for digitalisation. The approach adopted by the customs authority to deploying digital technologies is the

establishment of a clear rationale and use case, together with the introduction of a pilot on a limited scale, in order to first assess the feasibility and viability of the technological solution in meeting the business requirement (Respondents 1 and 4). This approach is a relatively common trend in the introduction of new technologies (Okazaki 2018).

4.1.3 Enablers of digital customs transformation

Customs transformation strategy

The need for governments to set out a strategy for modernising and digitalising public administration to create public value for citizens has received significant attention in the literature on digital-era governance (Ravšelj et al. 2022), including for building the customs systems of the future (Junquera-Varela et al. 2022). Embedding the logic of the adoption of digital technology in the strategy of the organisation is necessary, as it provides a clear blueprint (Fernandez-Vidal et al., 2022) and a focal element of strategy implementation (Jöhnk et al. 2022). As Respondent 1 noted, "[c]ustoms automation has always been part of the SARS strategic priorities, since its inception in the early 80s". Furthermore, the current strategy of SARS, known as Vision 2024, incorporates a specific focus on data to improve outcomes and to modernise its systems. Although strategic objective 6 encodes the need to modernise the customs authority's systems by providing digital and streamlined online services, "it's to facilitate the other three objectives" (Respondent 3), related to providing clarity and certainty for taxpayers and traders on their obligations (strategic objective 1); making it easier for taxpayers and traders to comply with their obligations (strategic objective 2); and detecting those who do not comply to make non-compliance hard and costly (strategic objective 3).

Organisational strategy is fundamentally about making choices between competing demands, in line with the direction set out. Strategic planning in a public sector context promotes strategic thinking, acting and learning; improves decision-making; enhances organisational effectiveness, responsiveness and resilience; and improves organisational legitimacy (Bryson 2010). Having a commitment to the modernisation of systems through digitalisation as an explicit objective represents an overt choice about what the customs authority deems a priority, and serves to influence how strategic priorities translate into real-world project interventions.

Digital leadership

Prior research has established the important role of leadership in promoting digital transformation (AlNuaimi et al. 2021; Porfirio et al. 2021; Tangi et al. 2021). The characterisation of the nature of the leadership provided in the process of digitalising the customs administration function in South Africa emphasises (i) the ability to envision the future customs administration; (ii) the required knowledge of digital technologies and extensive knowledge of the customs environment; and (iii) the ability to mobilise buy-in and support for the transformation effort.

Envisioning the future in order to establish a desired future state was emphasised as an important enabler of the digitalisation process of the customs administration. It was considered important to articulate this vision, and also to take the necessary action to reach the envisioned future through concrete action.

> You want a leader that has a future view in mind, but not only that, you want the person that's got the necessary character to be able to articulate that vision, but also to lead that vision in its implementation. (Respondent 2).

Moreover, knowledge of digital technologies, and of the customs administration environment and the international trade system it seeks to support, is significant. It is important to recognise that "understanding the technology itself is not the solution", but rather that "understanding how technology can assist the business realise the goals" (Respondent 3) is crucial.

> And they were technology enthusiasts, if I can put it that way, because I think … they were very much, if I were to look from a customer's perspective, very much up to date with trends and megatrends at WTO and WCO … that were driving progressive customs administrations. (Respondent 4)

Creating and articulating the vision, and applying the knowledge of technology and customs administration are important leadership conditions, but it is also necessary to mobilise the organisation towards the envisioned future and the changes it involves.

> … people see it happening and they think that, you know it, perhaps it just happened by osmosis or something like that, but it's difficult in that change is a process and it's a difficult process on its own. So, you have to make sure that they come with you and trust in what you're saying and trust in your story, and once they can believe what you're saying and they can buy into your vision, then they will just execute because that's what's needed. Once a person realises, oh, this is the way to go and this is the best way to go, by the way, people just execute, but you keep on emphasising the point about the future, about the transformation, about digitalisation. (Respondent 2)

Platformisation practices

Mergel et al. (2019) call for additional research to highlight digital transformation approaches in practice as they relate to the digital agendas of organisations. The term 'practice' implies repetitive performance that enables one to attain recurrent, habitual, or routinised accomplishment of particular actions (Jarzabkowski 2004). Several practices were highlighted in the case study that enabled the implementation of digitalisation of the customs administration function. The customs authority has a series of well-established practices linked to the software development life cycle followed in the design, development and deployment of digital adoption projects. The practice of formulating a business requirement specification (BRS) sets the process for technological innovation in motion by *articulating* in more detail how a solution should address the business need.

> … the business case is very high level. It's very helicopter-eagle type of view, but the BRS comes closer to the meat and to say we need this message from this system to that system and it should move this way rather than that way, right? And then this is what it will say this message. And once this system received this message, this is what it will do with this message and it will send output to such and such a system and that system will do that. (Respondent 2)

A project manager is appointed and a project is established following the evaluation and approval of the BRS. Importantly, all the parties that are affected by the project are involved, including "the change management people, the policy people, the process engineers, the operational people, the IT and everything" (Respondent 1). The BRS is then translated into a functional requirement specification (FRS) that *translates* the business need into a technical requirement. The responsibility to prepare the FRS is handed to an internal or external developer.

> So once that functional requirement specification is available, all the parties are brought together again and we go through that thing page by page and all the questions and the issues are deliberated. And this might take a day. This might take weeks … once that is signed off, then the development will start. (Respondent 1)

The software development process may be allocated to developers internal to the customs authority, or to external developers, depending on the nature of the project. On completion of the software development process, the quality assurance practice is initiated. This involves the testing of the software in the internal environment of the customs authority. Once the quality assurance is complete, the software is rolled out into production, incorporating the required change management processes such as training.

> And once development is completed, then it's brought into our IT environment where it's checked for bugs and other security matters, and then it's stabilised onto our operating system in a user testing environment, where we've got special people that come in and test, do a positive and negative testing on the solution. If external parties, like clearing agents [are needed], they're involved. We involve their service providers and they all have their tasks, also included in the project plan. They get a slot where they can, where the traders can do testing on the application as well. And once everybody's happy, it's then rolled out on an agreed to date into production … Other people involved as well will be our communication people because what the communication people will do will inform the traders. And then there will be a pre-launch letter that will go to the industry explaining this is what the changes are going to be and this is how it'll impact you and all of that. Consequently, on the trade side, their service providers will have training components that then go and train the importers/exporters and the clearing agents on how to use the changes in the software, as such. So, it's a very well-oiled machine ... (Respondent 1)

The customs authority has well-established project management practices in place to support the software development lifecycle (SDLC). An important practice for *aligning* projects with business needs was the hosting of a weekly meeting in which the progress on projects is reviewed. Meetings are an important practice for stabilising existing strategic orientations or for proposing variations that cumulatively generate change in the strategic orientation (Jarzabkowski and Seidl 2008), and have stabilising and de-stabilising effects related to strategy implementation (Suddaby et al. 2013).

> [W]e … facilitated a weekly session with over 100 people and making sure that we are aligned. [I]t was called a Megawatt Thursday session. We used to have to produce the reports on the Wednesday night that would be discussed on the Thursday. But I think, you know, that just keeps the rhythm and it keeps everybody again marching in the same direction. The communication, the collaboration between all these environments is absolutely key to make a success of this project. (Respondent 3)

The customs authority has also developed a strategic sourcing practice of software development resource mobilisation, driven by the need to *scale* up its access to development resources in the early stages of its first Customs Modernisation Programme (Respondent 3). The organisation acquired the company, Interfront (Clidet 967 (Pty) Ltd. at the time), in 2010 as a development partner to assist in the mobilisation of the necessary technical resources to support the modernisation of its customs systems (Interfront 2021). Interfront is one of four strategic development partners, each with its respective specialisation, in the customs systems environment (Respondent 3). Having a wholly owned company enables the customs authority to ramp up access to resources during the software development phase of a project and scale down

during the maintenance phase. The strategy guiding access to development resources is to keep the development of critical systems, such as the enterprise services and risks engines, in-house.

> … our strategy was always that most critical systems and IP remains in-house. So, for example, our enterprise services base is fully in-house, our risk engines are fully in-house. So, we picked certain things that we said we're not prepared to compromise to give those externally. So, we had basically four main strategic development partners of which Interfront, the wholly-owned subsidiary, count them as an external development partner.

Several benefits are associated with the established practice of long-term development partnerships. These partnerships have enabled the customs authority to scale up and down fast in order to meet the development needs of a specific project. The introduction of the Siyakha Programme was, amongst other things, informed by the limited capacity of the customs authority in 2000, when it was recognised that "the SARS IT environment, although stable, does not have the strength and maturity necessary to provide the kind of on-line, real time service that is required by key stakeholders" and when the system was plagued by several challenges, including "lengthy applications development life cycle, inadequate management controls, skills shortage and a deficient permanent management group … with certain IT infrastructure, applications and strategies … outdated" (SARS 2001). This made the need to ramp up capacity through strategic partnerships critical:

> I think that's really helped us in terms of, you know, from a capacity perspective, they're able to expand and shrink a lot quicker than we are. And in the technology world, I mean, we run through these waves of modernisation where we don't need two-hundred people developing a system when we're going into the maintenance type of phase. (Respondent 3)

Furthermore, the strategic partners learn to understand the business of the customs authority, get to know the systems, and are able to deliver to business needs in relative short time frames.

> They understand our internal systems very well. I mean, they are developing those systems. So, to get a change done to them is not complex. These people now pretty much understand our system. If we tell them … this is what you must change on this system and the impact on that system. So very quickly, they are able to determine what needs to be done. (Respondent 5)

4.1.4 Digital transformation of customs administration

Digital ecosystems and applications

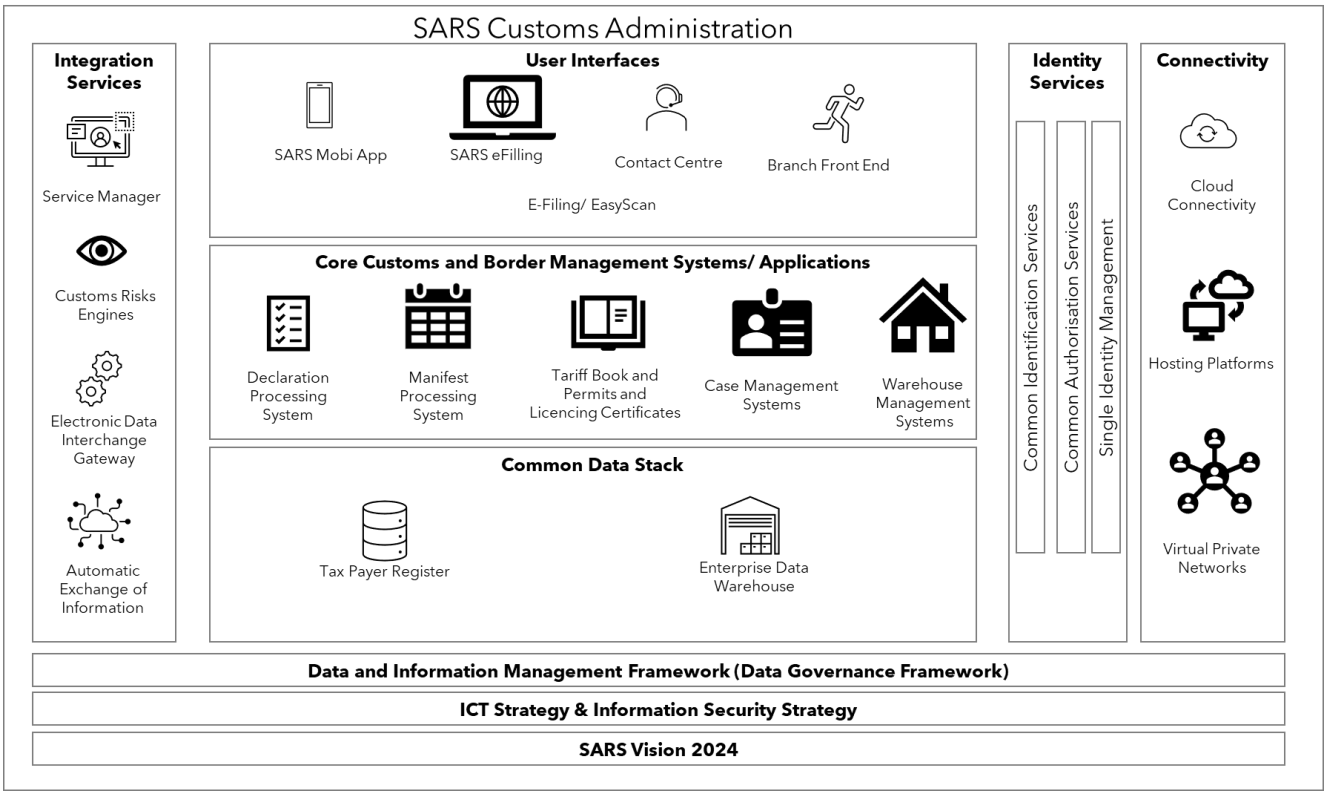
The customs and border management system comprises the *strategic frameworks* that guide the development of the system, the common data stack, core systems, user interface technologies, and the technologies that enable integration services. The digital systems development is guided by several strategies and frameworks. These include the overall strategy, SARS Vision 2024, the ICT Strategy, the Information Security Strategy, and the Data and Information Management Framework, which collectively form the basis of the recently adopted Data Governance Framework (SARS 2021b).

The *common data stack* comprises the Tax Payer Registry and the Enterprise Data Warehouse. The Tax Payer Registry is the cornerstone, and a continuous process of cleaning the registry is under way. The Enterprise Data Warehouse contains data from all the different systems within SARS.

Several systems make up the *core of the customs and border management system*. The Declaration Processing System facilitates the expedited clearance and release of goods under customs procedures. The Manifest Processing System facilitates transport and cargo reporting and the goods accounting management for inbound and outbound cargo. The Tariff Book, Permits and Licensing Certificates support the control of prohibited, restricted and security-controlled goods. The Case Management System supports the investigation of cases, while the Warehouse Management System supports the customs warehouse functions and responsibilities.

Service integration is enabled by the Service Manager, Electronic Data Interchange Gateway, Automatic Exchange of Information services and the Customs Risks Engines. Interaction with users is enabled through the SARS Mobi Application, SARS e-Filing, Contact Centres and Branches.

Figure 7: SARS Customs Administration Architecture and Systems Components



Source : Authors' compilation

Digital capabilities orientation

From the perspective of dynamic digital capabilities (Warner and Wäger 2019), the customs authority is developing its *digital sensing capabilities*, including improved *detection* and *forecasting* capabilities on the basis of the expanded use of data and digital technologies. This is aimed at detecting and identifying non-compliance and abuse of the tax system through data obtained from declarations and third-party data, combined with historical data on compliance behaviour, and data regarding financial flows and assets held locally and abroad (SARS 2021a). Furthermore, the organisation is improving its ability to forecast revenue with the use of various statistical models that take into account the prevailing and forecasted economic conditions, combined with a detailed analysis of the likely performance of the different tax types (SARS 2020).

The detection capabilities further strengthen the customs authority's ability to seize opportunities for improved digitally enabled *compliance enforcement* through more selective

and targeted audits. Improvements in the risk engine rules facilitate fewer, but more targeted, audit interventions that improve detection rates and yields, while decreasing false positives (SARS 2021d). The improved dynamic capabilities to digitally sense and seize opportunities further enhance the custom authority's ability to continuously reconfigure its resource base, with a view to becoming more *proactive* in the exercise of its mandate.

> SARS will become more pro-active in its response to non-compliance when it uses technologies and techniques that mine data in the public and private domain, to assist with machine learning predictive modelling. In the longer term, this will be leveraged to identify tax avoidance and evasion practices and reduce false positives. (SARS 2021b: 45)

The dynamic digital capabilities described above arise from a series of operational capabilities. These include management of customs business knowledge, process and project management, digital technology development and management, and communication and change management (Respondent 1). The role of data in building up these operational capabilities is crucial.

> I think we've also very much facilitated the process and made a lot of interfaces available such that our external parties can collaborate with us and give us the data easily and simply as well. [M]ore and more we making decisions based on the data. And nowadays we've got a lot more data that helps us look at the historic data, predict what would be the impact of a particular change or modernisation initiative, and take it from there. So, I think and that's been a huge kind of a step change along the journey. (Respondent 3)

4.1.5 Continuous service innovation

The establishment of digital channels to administer customs services has been one of the key outcomes of more than forty years of service innovation in the customs environment. This has contributed significantly to the *ease, convenience and cost-effectiveness* with which taxpayers and traders can comply with their obligations, noting that 86.3% have adopted digital platforms to interact with the customs authority. Furthermore, the cost-effectiveness of the process is enhanced through time saving, as digital channels enable the processing of 95% of the 5.6 million customs declarations in under 10 seconds each (SARS 2021b). These outcomes have further strengthened buy-in in the customs stakeholder community with respect to its digital transformation initiatives.

> I can tell you now with traders it's time and money. And we've always had excellent support from the industry, more so from the importers … [they] have been with us on every journey that we've made. So, there's no buy in required. They they're with us. In actual fact, they

> push us. [W]e have a regular systems engagement with the service providers for the for the industry. (Respondent 1)

Service innovation has also provided SARS with the ability to *scale* to deal with increasing volumes of trade. In the 2000/2001 financial year, SARS processed 1.9 million customs declarations (SARS 2001), whereas it processed 5.6 million in 2020/2021.

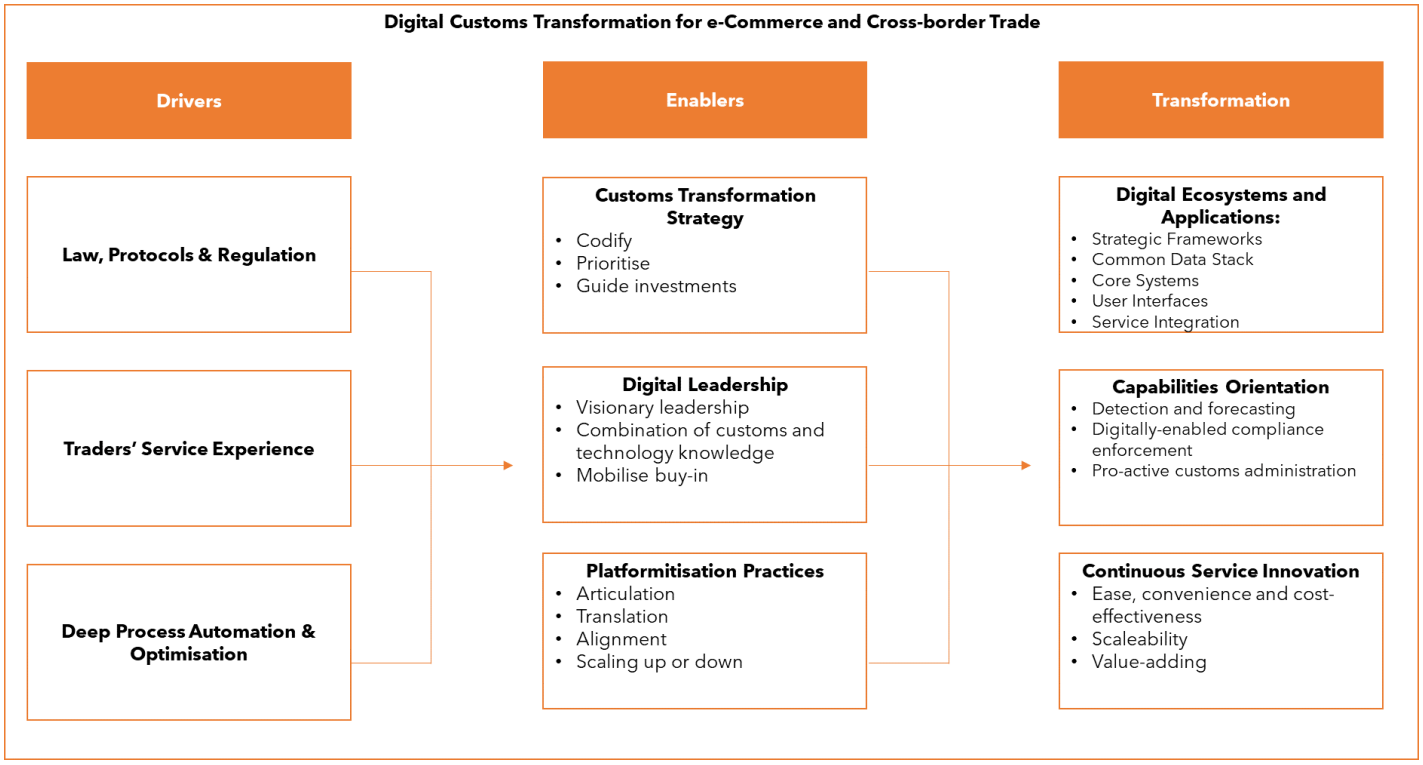
The building of the data analytics capabilities of SARS is contributing to the development of value-adding services and the changing skills profile of the organisation, as more routine tasks are displaced by automation and the significance of the data available for analysis grows.

> SARS offers more of its services on-line and disintermediate the need for some of its services, it duly considers the opportunities to re-direct certain roles into more meaningful work. An example would be to consider the effect of the implementation of auto assessments, which leveraged data to auto assess more than 2.8 million taxpayers through a technology enabled offering, with a significantly reduced dependency on human intervention by SARS staff. Consequently, the reduced cost of compliance and convenience for taxpayers should also be considered. Investment in the following broad skill-sets are required across the areas to support enforcement functions to address non-compliance and enhance capability: multiple tax type analytical skills, machine learning developers; and comprehensive auditing skills that can audit multiple entity, multiple-products, and multiple-risks. (SARS 2021b)

5. Analysis and Implications for Customs Modernisation and Transformation

Revisiting the analytical framework and applying it to the data, we now offer a simplistic strengths and weaknesses analysis on the nine themes relevant to drivers, enablers and transformation. These themes are law/protocols/regulation, traders' service experience, deep process automation and optimisation (drivers), digital transformation strategy, digital leadership and platformisation practices (enablers) and digital systems development and deployment, capabilities orientation and continuous service innovation (transformation).

Figure 8: ***Key Insights for Digital Customs Transformation***



5.1 Law, Protocols and Regulation

The kinds of standardisation required for customs administration across borders sets up a foundation for the redesign of legal, regulatory and interoperability frameworks at the national level because of the need to domesticate global and regional standards. While some of the legal foundations required for customs modernisation are already in place in South Africa and among its trading partners, continuous adjustments will be needed in national laws, and in associated national regulations and standards across African countries, in the context of the emerging protocols for trade, AfCFTA annexes and guidelines, and the introduction of digital certificates. Major legislative redesign will be needed over the next three to five years, and will require concomitant adjustments by the customs authorities in South Africa, as well as authorities across the region and elsewhere, if the vision of an African continental free trade area is to become a reality. Approaches to regulation will need to become increasingly flexible, light in touch and based on principles, rather than in terms of command and control, in order to make rapid adjustment possible. In particular, the areas of cybersecurity, cybercrime and data protection will require significant attention and human resource investment relevant to the customs

environment. In the case of cybersecurity, regulation may need a combination of light-touch and heavy-handed approaches.

5.2 Traders' Service Experience

The Customs Data Model is at the heart of the entire system of international trade facilitation, effectively creating the basis for a data-driven cross-border trade environment. Highlights of the enhanced service experience for traders has been the consistent speeding up of the movement of goods across borders. This has been highly beneficial to traders in terms of time and money, yet there is more to do in shifting to a trader-empowering, risk-managed customs environment to promote heightened trade flows and economic empowerment in this part of the supersystem. Furthermore, the South African customs authority has taken an open digital governance approach, inviting traders to co-create with respect to the design and development of the core customs and border management systems. Co-creation is an important principial approach to digital innovation.

5.3 Deep Process Automation and Optimisation

While much of the customs modernisation project to date has been about fostering incremental change and avoiding disruption, it has started to create the thresholds required for further development. It is reasonable to 'start small, be agile, fail fast, then scale fast'. The South African customs authority is in the early stage (modernisation) of long-term digital transformation and will need to build towards deep process automation and deep process innovation. This will be needed in order to optimise its business processes and offer a powerful service catalogue to promote both historical forms of trade and new forms of trade, such as digitally ordered and digitally delivered trade. Data collection in relation to the latter is still a challenge. A transition from incremental digitalisation to deep process automation (DPA) and deep process innovation (DPI) is necessary in environments where 'the process is the service', in this case customs processes being a service to traders. DPA, in which every aspect of a process is automated, and DPI, in which new process elements or dynamics are continuously incorporated into customs administration in an end-to-end approach, can create institutional capabilities that did not exist previously, for example the capability to introduce risk-weighted checking of goods at border posts, rather than checking every parcel or container. While a level of realism is necessary, since customs authorities are not all equally advanced in digital process design and implementation, the objective of countries must be to achieve a common standard of process automation. It is also noted that there are two major challenges for DPA and DPI, namely the limited availability

of advanced digital skills (both technical and user skills), and challenges in terms of the allocation of funds for customs digitalisation

5.4 Customs Transformation Strategy

In the SARS Vision 2024, customs modernisation is prioritised and legitimised, indicating a clear pivot towards data-driven customs management and identification of risks. As a result, audits and investigations can become more targeted, and resources can be allocated to areas of high risk. The evidence gathered indicates significant efforts to codify and prioritise key parts of the strategy in order to guide investments in modernisation. The evidence suggests that, at this stage, the focus is on modernisation, in line with international guidelines and developments, but that investments are not yet designed to transform the entire system of customs administration. While strategy is foundational to change, it only sets the broad direction – it creates direction, but not certainty. In the context of an uncertain endgame, which is typical of any process of strategic change, steady leadership – in particular steady digital leadership – is a key ingredient. Digital leadership must operate at multiple levels of the customs authority, requiring high levels of knowledge and skilful practice with respect to customs administration and the future possibilities for digital innovation. Equally important, since strategy is strongly influenced by external factors over which the customs authority has no direct control, collaborative forms of strategy and governance with other South African border entities, and with international counterparts, will become more important as the customs modernisation project gains ground.

5.5 Digital Leadership

Alongside strategy, an infusion of digital leadership and behaviour change is a requirement, for example building a culture of facilitating trade and cross-border movement of goods and persons and not frustrating trade. Furthermore, the sequencing of reforms can be both strategic and tactical, where improving governance alignment across borders and advancing the opportunities for process improvement are both strategic concerns. Some countries will be lead countries, but the need for effective coordination amongst border agencies will require behavioural changes, supported by joint training programmes in change management and inter-agency co-operation.

5.6 Platformisation Practices

Three identifiable types of platformisation practices were observed, namely articulation and translation, alignment, and scaling up and down. The business requirements specification articulates the business need, the functional requirements specification translates the need into

the solution(s)/application(s), while the software development lifecycle structures the process of arriving at solutions and lays the basis for stability in integration. By structuring the process of translating business needs into solutions design and adoption, the software development lifecycle provides a platform that enables the articulation of business needs with technology solutions. A meeting dedicated to alignment encourages successful outcomes, as it creates a platform for monitoring progress. Resource mobilisation adjusts to the scaling up and down, which is associated with intense periods of modernisation followed by periods of stabilisation. These practices make sense in the context of early-stage customs digital evolution. Continuous study of this evolution will be needed to observe and understand the practices that emerge and that are needed for scaling fast.

Understanding the nature of platformisation in the customs environment requires further research on the technologies and applications being adopted, whether artificial intelligence, machine learning, robotic process automation, or data analytics. Tracking platformisation is important for identifying and sharing what the leading customs authorities in Africa are doing with the followers who need to know what the leaders are doing.

5.7 Digital Systems Architecture

The customs administration digital architecture for South Africa is founded on SARS Vision 2024, the ICT Strategy and Information Security Strategy, and the Data Governance Framework, all of which create a coherent administrative fabric. The common data stack is available to the five core customs and border management systems for data mining. The four user interfaces (Mobi App, eFiling, Contact Centre and Branch Front End) offer redundancy and convenience/ease of contact for traders, clearing agents and others. The necessary data integration services and identity services are in place for the current level of modernisation, and levels of connectivity are adequate or better. New challenges will arise as customs modernisation shifts into increasingly complex platformisation and customs digital transformation. For example, the AfCFTA Protocol on Digital Trade and the relevant AfCFTA annexes and guidelines will inform future digital systems architecture.

5.8 Capabilities Orientation

Strategic dynamic capabilities that are visible in the customs modernisation project include sensing, reconfiguring the resource base to seize opportunities, and sustaining an environment of proactive enforcement. Detection and forecasting are the capabilities that enable sensing, for example identifying high-risk traders by using risk engines and associated data analytics. Digitally

enabled compliance enforcement allows the customs authority to seize opportunities and manage threats. With respect to human capabilities, there is interest in appointing data modellers, data analysts and a chief data scientist, thus building out data science capability. All these capabilities illustrate the future orientation necessary for future long-term digital transformation. The continent will need a large number of chief data scientists, as well as data science teams, in the customs arena.

5.9 Continuous Service Orientation

The evidence for the South African case study clearly indicates continuous service innovation, for now largely in terms of convenience, speed and range of service channels. This augurs well for the challenges ahead, as customs authorities will work to adjust their service environments to the requirements of the eight trade protocols and the various annexes that constitute the African Continental Free Trade Area. Continuous service innovation at customs administration level is essential to facilitate cross-border trade, in particular to promote e-commerce, including digitally ordered trade and digitally delivered trade. In this latter context, service innovation includes communications services and applications, as well as financial services and applications, to promote ease of conducting trade.

6. Concluding Statement

This initial case study on customs modernisation in South Africa illustrates the value of a steady, committed, consistent incrementalism as a route to digital transformation in the early stages of modernisation. The steps taken to date focus on creating the interfaces required across multiple sub-systems of a complex customs ecosystem (the South African side of the border), and the importance of interoperability with a larger super-system (the many customs authorities of South Africa's trading partners). Questions that remain to be answered include the extent to which this early-stage incrementalism leads to deep process automation and deep process innovation, which will lay the foundation for rapid scaling at the next stage of customs digital transformation.

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