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Customs Revenue Optimization in Nigeria: Reviewing the Effectiveness of Tariff Reforms, Valuation Policies, and Compliance Mechanisms

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Abstract

Customs revenue constitutes a critical component of Nigeria's fiscal architecture, yet persistent leakages arising from under-valuation, tariff manipulation, HS misclassification, digital system vulnerabilities, and low compliance behaviour continue to undermine revenue performance. This study evaluates the effectiveness of tariff reforms, customs valuation procedures, HS classification reforms, and digital modernization initiatives—particularly NICIS II, CAPPS, scanners, and e-invoicing—in enhancing revenue optimization within the Nigeria Customs Service (NCS). Using a policy review combined with multi-case analysis of Lagos ports, high-risk HS chapters (39, 85, 87), NICIS II rollout, and enforcement–compliance dynamics, the study applies qualitative content analysis and the Walt & Gilson Policy Triangle to assess how institutional, operational, and behavioural factors interact to shape revenue outcomes. The findings reveal that while tariff simplification and digital automation have produced moderate improvements, systemic weaknesses in valuation governance, classification accuracy, and institutional enforcement continue to facilitate leakage. Digital systems significantly enhance transparency and audit trails but are constrained by system downtime, circumvention, and partial inter-agency integration. Compliance behaviour remains strongly influenced by enforcement strength, procedural predictability, and institutional trust. The study concludes that sustainable revenue mobilization requires integrated reforms combining automated valuation systems, harmonized tariff and valuation databases, mandatory e-invoicing, enhanced HS classification capacity, and full implementation of a National Single Window. These reforms must be complemented by risk-based compliance strategies to strengthen deterrence and promote voluntary compliance across the trading community.

1. Introduction
1.1 Background to the Study

Customs revenue, therefore, can be viewed as one of the most critical components of Nigeria's non-oil revenues, which can be regarded as the main sources of public expenditure, infrastructure development, and economic sustainability. It has been noted that, for most developing economies, the revenue collected by the custom authorities ranges between 40% and 60% (Adewuyi, 2021 [3]; World Bank, 2022). This, in itself, speaks volumes about the critical role that custom revenue plays for the economic sustainability and development of the country, and this can also be noted for the Nigerian economy, which has placed custom revenue at the center of economic development, especially with the decline in oil revenues and the increased use of trade tax revenues for public expenditure (Ezenwa & Okereke, 2023) [6].

It should be appreciated that despite the significance of the customs revenue generation function, it remains challenged by the persistent problem of revenue leaks resulting from the under-valuation of imports, HS classification of the importable goods, inaccurate declarations of the same, and the prevalence of illicit trade practices. In this respect, empirical literature confirms that the problem of inaccurate valuation and HS classification of importable goods by themselves result in substantial leaks to customs revenue every year, with importers using the two processes to manipulate prices on import invoices and exploit the difference between the two systems to conceal the identity of the importable goods (Adegbola & Olayinka, 2020 [1]; Yusuf, 2024).

Subsequently, the Nigerian Customs Service has initiated a series of modernization initiatives that include the reform of the

Harmonized System classification, the adoption of the World Trade Organization Valuation Agreement, and the use of information technology tools such as the Nigerian Integrated Customs Information System II and the Customs Automated Process Pipeline System. These tools have the capacity to eliminate human intervention factors that have been identified as the single most important contributor to the incidence of corruption and revenue leakage that often accompanies the customs declaration process (Ojo & Fasona, 2022 [12]; WCO, 2023). Insights derived from the experience of similar customs administrations worldwide suggest that the use of information technology has the capacity to reduce the overall declaration process and enhance transparency; thus, the relevance to the revenue optimization initiative cannot be overstated (Khalil & Amein, 2023 [8]; Choi, 2019).

1.2 Problem Statement
Despite the numerous reforms, Nigeria still continues to face sizeable losses in terms of revenue collected by the custom department, which are attributed to poor compliance by importers, the use of valuations, tariffs, and the problem of smuggling. Evidence has shown that the problem of non-compliance, which arises due to poor enforcement, low deterrence, and institutional issues, still poses a problem for the revenue collected by the custom department (Oladimeji & Uhunmwuangho, 2022; Essien, 2024 [5]).

Likewise, valuation inconsistencies, as well as non-harmonized practices on tariffs and valuation, have created an opportunity for subjective decision-making, resulting in unequal treatment of importers, as well as expected distortions in revenues (Adeoye & Adigun, 2021) [2]. Digital reforms such as NICIS II and CAPPS, despite being significant, are affected by issues such as system bypass, inadequate integration of relevant stakeholders, as well as system downtime, which undermines the use of automated controls (Ojo & Fasona, 2022) [12]. On the other hand, these inefficiencies are leading to losses in revenues, as well as eroding public trust in the customs administration, thereby impacting the implementation of available policy instruments, which are geared toward improving Nigeria's trade and fiscal landscape.

1.3 Research Questions
How effective are Nigeria's tariff reform measures in promoting customs revenue optimization?
To what extent have valuation policies improved accuracy and reduced leakages?
How have digital systems (NICIS II, CAPPS, scanners, automation) enhanced revenue assurance?
How does importer compliance behaviour influence revenue outcomes?

1.4 Objectives of the Study
To review the effectiveness of tariff reforms in strengthening customs revenue generation.
To assess the impact of customs valuation procedures on revenue optimization.
To examine the role of digital systems in minimizing leakages and improving transparency.
To analyse importer compliance behaviour and its implications for revenue performance.

1.5 Scope of the Study
The current study seeks to examine the customs administration of the Nigeria Customs Service between the years 2015 and 2025. During this period, the customs administration underwent extensive modernization, with the introduction of the NICIS II, extensive work on HS classification, and significant reforms to customs tariffs and valuation. In addition, the analysis of the customs administration of the Nigeria Customs Service revolves around four major themes. These include the administration of customs tariffs, the processes of valuation, compliance, and the mechanisms of digital transformation. In addition to the analysis of the customs administration of the Nigeria Customs Service, the current study incorporates the use of case studies of specific ports and border stations to generate alternative perspectives on the optimization of customs revenue.

1.6 Significance of the Study
The research has policy and intellectual significance. In policy terms, the research contributes to the generation of knowledge that can inform the design and implementation of interventions aimed at improving revenue mobilization efforts within the context of the fiscal pressures facing the Nigerian economy. In the context of the need for economic diversification beyond oil revenue dependence, the exploration of the interaction between tariff setting, valuation precision, compliance patterns, and digitalization can inform initiatives aimed at improving transparency and reinforcing fiscal sustainability (World Bank, 2022; Yusuf, 2024).

2. Literature Review
2.1 Conceptual Review
2.1.1 Customs Revenue Optimization
The optimization of customs revenues is defined as the systematic improvement of various aspects of the customs, policies, and technology to obtain the highest legally due revenues while minimizing leakage, fraud, and inefficient operations. For developing countries, especially Nigeria, the optimization of revenues is essential due to the critical fiscal significance of revenues, especially those of customs, to the development of the macro-economy (Ezenwa & Okereke, 2023; Adewuyi, 2021) [6, 3]. For countries to obtain an efficient optimization of revenues, various studies have shown that countries that obtain the highest revenues always have efficient digitalization, risk management, and standardization of valuation, especially those that adhere to international agreements (Khalil & Amein, 2023 [8]; WCO, 2023). Therefore, the optimization of revenues is not only an economic activity but rather a governmental activity that is based on efficiency, reliability, and transparency.

2.1.2 Valuation Procedures and the WTO Agreement on Customs Valuation
Valuation procedures determine the dutiable value of imported goods, thus directly impacting the revenue generated at the custom office. Under the World Trade Organization Agreement on Customs Valuation, custom administrations have been advised to follow the Transaction Value Method, where the price actually paid or payable is the main consideration and the addition to the price is kept at the minimum possible level. This approach has been

adopted to enhance the uniformity and fairness of the valuation mechanism across the globe (WCO, 2023; WTO, 2024). However, the countries in the development stage face problems such as under-invoicing, misdeclarations, and the unavailability of real-time price information, which affects the accuracy of the valuation procedures (Yusuf, 2024; Adeoye & Adigun, 2021 [2]).

In Nigeria, valuation inconsistencies, particularly, have been an area of concern, as it has created avenues for manipulation, rent-seeking, and valuation discretion on the part of officers as well as traders. Evidence of the problem suggests that poor enforcement of the principles of ACV has been one of the major causes of leakage, particularly in risky products such as electronics, automobiles, and polymers (Adegbola & Olayinka, 2020 [1]; Oladimeji & Uhunmwuangho, 2022). Therefore, it can be stated that sound valuation practices, as prescribed by WTO, are crucial to ensuring the integrity of customs revenue assurance.

2.1.3 HS Classification
The Harmonized System (HS) codes form the basis for the standardized system of classifying traded goods. It uses six-digit codes. It is essential for customs purposes because it is used for calculating customs duty rates, obligations, and revenues (WCO, 2023). From an empirical perspective, HS codes are seen as a major contributor to customs revenues lost due to either deliberate or unintentional errors, where duty evasion is done through customs switching or misrepresentation of the actual nature of goods (Choi, 2019; Yusuf, 2024).

Nigeria also faces similar challenges, especially in product areas where tariff differentials provide an incentive for strategic classification. Typical scenarios include classifying new products as used products, classifying industrial products as consumer products, or classifying products with higher tariff rates and placing them in lower tariff rate subheadings. Research indicates that continuous training, a data-based classification system, and digital tools for supporting decisions reduce errors in classification and optimize customs revenue. Therefore, strengthening customs classification reforms is an essential element of customs modernization.

2.1.4 Digital Customs Systems (Single Window, NICIS II, CAPPS, e-Invoicing)
However, digitalization has now been recognized at the global level, especially for those countries that wish to achieve greater degrees of transparency, minimize delays, and prevent leakage of revenues. Some of the major developments that can be highlighted at the national level of Nigeria include the national single window, NICIS II, CAPPS, e-invoicing, and automated scanners, amongst others (Ojo & Fasona, 2022; Khalil & Amein, 2023) [12, 8].

Single Window platforms integrate customs with port authorities, banks, shipping lines, and regulatory agencies to streamline information exchange and reduce bottlenecks.

- NICIS II strengthens risk management, valuation referencing, and audit trails, thereby minimizing human discretion.
- CAPPS enhances cargo tracking, document integrity checks, and settlement of customs processes.
- E-invoicing provides a mechanism to authenticate transaction values and cross-check importer declarations, particularly in high-risk sectors.

Global studies demonstrate that digital systems significantly improve revenue performance by increasing compliance, reducing physical contact, minimizing corruption, and standardizing procedures (Khalil & Amein, 2023 [8]; Choi, 2019). For Nigeria, digitalization remains central to closing revenue gaps and ensuring better alignment with international trade facilitation standards.

2.2 Theoretical Framework
The current study is based on four interconnected theoretical perspectives that, taken together, highlight the dynamics of customs revenue optimization, importer behavior, institutional performance, and the adoption of digital technologies. Deterrence Theory offers the basic framework for understanding compliance behavior, which asserts that people are inclined to comply with rules and regulations if the likelihood of being detected by authorities and the severity of punishment are high. In the customs context, the Deterrence Theory implies that importers are less inclined to customs offenses such as undervaluation, misdeclaration, and false declarations if the customs' verification systems, such as automated verification and penalties, are perceived to be effective (Adewuyi, 2021; Essien, 2024) [3, 5]. However, empirical studies support the claim that customs compliance worsens and revenue leakages rise if customs authorities are lax or discretionary (Yusuf, 2024), making the Deterrence Theory relevant to the analysis of customs compliance issues.

The Institutional Theory enriches the discourse by focusing on the role played by the power, stability, and acceptability of rules in shaping organizational outcomes. In customs management, for example, the role played by the quality of institutions is seen in the provision of clear valuation guidelines, standardized HS codes, clear tariffs, and digital systems. In effective customs management, these are essential in limiting discretionary powers while ensuring traders' compliance (Ezenwa & Okereke, 2023) [6]. In contrast, the weakness of institutions is seen in inconsistencies in valuation systems or digital systems that traders take advantage of for tax evasion (Adeoye & Adigun, 2021) [2]. Thus, the Institutional Theory is essential for explaining the role played by inefficiencies in customs management in Nigeria.

To this end, this discussion now turns to the Technology Acceptance Model, which, as explained above, offers insights into how customs officials, traders, and intermediaries embrace or resist digitalization efforts, including NICIS II, CAPPS, SW, or electronic invoicing, among others. Specifically, TAM argues that technology adoption or implementation depends on two factors: how useful it is to the user, as well as how easily it can be used. Recent studies on digitalization efforts in modernization processes in customs show that digitalization adoption increases significantly if officials perceive that digitalization helps to avoid unnecessary delays, increases transparency, as well as limits or eliminates unnecessary human interactions, as argued in recent studies by Choi, 2019; Khalil & Amein, 2023 [8]. Conversely, officials resist digitalization if, in their perception, digitalization makes things unnecessarily complicated, or if digitalization interferes with informal processes that officials have developed over time. In Nigeria, therefore, digitalization success depends not just on how technically sound

digitalization efforts are but also how officials, traders, or intermediaries embrace or resist digitalization, which makes TAM relevant to assessing revenue impacts associated with digitalization efforts.

Lastly, the role of the Principal-Agent Theory is to provide an analytical tool for the relationship between importers and customs agents. Here, the agents, being representatives of the state, have the information advantage regarding the real value and type of goods imported, which can lead to manipulation and corruption (Ojo & Fasona, 2022) [12]. Agents can be swayed to undervalue the goods and classify the goods at a favorable heading under the Harmonized System for the importers. However, digitalization and the use of the valuation mechanism and risk management have been cited as tools for controlling the agents, which is discussed under the Principal-Agent Theory for the minimization of loss and inefficiency. Collectively, these theories provide a multidimensional perspective on the study of customs revenue optimization. Deterrence Theory provides a perspective on compliance behavior, while Institutional Theory provides insights into the strengths and weaknesses of the system. Similarly, TAM provides insights into the adoption of technology reforms, while Principal-Agent Theory provides insights into governance issues that may result in information asymmetries and discretion. The most applicable theoretical foundation for this study involves a hybrid approach that incorporates the application of Deterrence Theory and Institutional Theory, guided by the concepts of TAM and Principal-Agent Theory.

2.3 Empirical Literature Review

The empirical research conducted in the developing and emerging economies has repeatedly emphasized the importance and impact of the reform efforts related to tariffs in the improvement and enhancement of the performance and efficiency of the revenue collected at the custom agencies. For example, the research and analysis conducted in the economies of Nigeria, Kenya, South Africa, and Ghana have repeatedly emphasized the impact and importance of the reform efforts related to the improvement and enhancement of the predictability and efficiency of the revenue collected at the custom agencies (Adewuyi, 2021 [3]; Muriithi & Kiarie, 2020). For example, the research and analysis conducted in the economy of Nigeria have repeatedly emphasized that the reform efforts related to the restructuring of the tariffs under the Common External Tariff have positively impacted the revenue collected at the custom agencies, with moderate revenue gains and leakage in the sector with the highest dispersion (Yusuf, 2024). Furthermore, the research and analysis conducted in the economy of Kenya have repeatedly emphasized that the reform efforts related to the improvement and enhancement of the predictability and efficiency of the revenue collected at the custom agencies are not effective without the reform efforts related to the improvement and enhancement of the predictability and efficiency of the revenue collected at the custom agencies (Mutuku & Wanjiru, 2021). For example, the research and analysis conducted in the economies of South Africa and Asia have repeatedly emphasized that the reform efforts related to the improvement and enhancement of the predictability and efficiency of the revenue collected at the custom agencies have positively impacted the revenue collected at the custom agencies (Choi, 2019; Pillay & Khumalo, 2022).

The results of the empirical analysis on the reform of customs valuation and HS classification demonstrate that, despite the efforts, misclassifications, undervaluation, and inconsistent application of WTO rules on valuation continue to plague trade operations, posing challenges to trade facilitation, trade security, and trade compliance (Adeoye and Adigun, 2021 [2]; Oladimeji and Uhunmwuangho, 2022). For example, the results of the study on trade operations in Nigeria demonstrate that, despite the implementation of trade policies, trade leakage through valuation is an enduring phenomenon due to discretionary application, lack of an effective post-clearance audit, and lack of access to global price databases (Adeoye and Adigun, 2021 [2]; Oladimeji and Uhunmwuangho, 2022). Similarly, trade operations in Ghana and Kenya demonstrate that trade leakage through improper valuation and misclassifications, especially of high-risk products like automobiles, machinery, and consumer electronics, is a major contributory factor to low trade performance (Mensah and Tetteh, 2020; Muriithi and Kiarie, 2020). The results of peer-reviewed studies demonstrate that misclassifications under HS are often deliberate, influenced by differences in tariffs and lack of regulatory control (Adegbola and Olayinka, 2020) [1]. On the one hand, the results of the study on trade operations in Vietnam, Malaysia, and Korea demonstrate that trade leakage through valuation is low due to an effective valuation database, standardized HS, and officer training (Nguyen and Tran, 2023 [10]; Choi.

The digitalization of customs procedures is an area that has received considerable research focus in recent years. Research evidence shows that digitalization technologies, for example, ASYCUDA, NICIS II, e-payments, and automated risk management systems, have a significant positive effect on customs clearance speed, reduce discretionary powers, and enhance auditing (Khalil & Amein, 2023; Ojo & Fasona, 2022) [8, 12]. In Nigeria, for example, NICIS II digitalization was seen to have improved transparency and reduced the scope for manual assessment errors, particularly for key ports (Ezenwa & Okereke, 2023) [6]. In other countries, for example, Rwanda, Mauritius, and Singapore, Single Window systems have shown positive effects on customs revenues and compliance (UNCTAD, 2021; Choi, 2019). There are however several research studies conducted in Nigeria that have shown that digitalization is often confronted with challenges, for example, low compliance, infrastructural limitations, and bypassing of digital systems by actors intent on subverting the digitalization process (Ojo & Fasona, 2022) [12]. It is thus clear that digitalization is an area that shows considerable potential but is dependent on enforcement and compliance. The empirical literature that examines the determinants of importer's compliance behavior shows that there are several determinants, which include fairness of customs procedures, trust, severity of penalties, consistency, and costs. In Nigeria, for example, it was found that importer's compliance was relatively low, mainly due to a lack of trust in customs procedures, which was caused by corruption and unclear procedures for valuation and classification. This was supported in other countries such as Ghana, Kenya, and Uganda, which also had low levels of importer's compliance, mainly due to customs procedures that were unpredictable and lacked transparency. In these countries, however, it was also found that there was high importer's compliance when procedures were clear and customs had

digital systems. In addition, the behavioral literature shows that deterrence also plays an important role in importer's compliance. In other words, importers would comply with customs procedures if they thought that there was a high likelihood that they would be detected if they were to cheat. This was supported in the customs procedures of Asian countries, which had digital systems that made it difficult for customs officers to have contact with importers. This resulted in high levels of voluntary importer's compliance since there were fewer opportunities for corruption. On the above-described areas of experience, the following gaps have been identified. Firstly, the literature on the Nigerian experience has not explored the nexus between tariff reform, valuation practices, digitalization, and compliance within a single analytical framework, notwithstanding their interlinked nature with revenue outcomes (Ezenwa & Okereke, 2023) [6]. Secondly, only a handful of literature has explored the Nigerian experience on the specific case studies on revenue leakages such as misclassification schemes, valuation practices, or bypasses using digitalization tools, notwithstanding their critical nature with the Nigerian customs experience (Yusuf, 2024). Thirdly, the literature on the Nigerian experience has not explored the impact of the cumulative reforms on the effectiveness and efficiency of institutions using a holistic approach. Moreover, the literature has not explored the Nigerian experience on the longitudinal impact assessment on the modernization initiatives on the Nigerian customs revenue optimization using a longitudinal approach that covers the period between 2015 and 2025.

Fig 1: Conceptual Framework for Customs Revenue Optimization

This framework depicts how tariff reform, valuation policies, HS classification reform, and digital customs systems (IVs) influence customs revenue optimization (DV) through institutional efficiency, process automation, and duty assessment accuracy (MVs), while enforcement strength, institutional trust, and technological acceptance moderate these relationships.

Fig 2: Conceptual Review Framework for Customs Revenue Optimization in Nigeria

This framework synthesizes the core dimensions of customs revenue optimization, illustrating how tariff reform, digital customs systems, enforcement and compliance mechanisms, and inter-agency trade facilitation interact to influence revenue outcomes. The model highlights the integrated roles of institutional governance, technological modernization, and behavioural compliance in strengthening Nigeria's customs revenue performance.

2.4 Explanatory Note to the Conceptual Framework
The conceptual framework describes the comprehensive means through which these customs reform interventions impact revenue optimization in Nigeria. The Independent Variables, such as tariff reform, valuation policy, reform of HS classification, and digitalization of customs, capture the core policy and institutional levers that are aimed at improving customs performance. The interventions are not in isolation but are mediated through three major Mediating Variables, namely, efficiency in institutions, process automation, and accuracy in duty assessment. The Mediating Variables provide clarity on the means through which better processes, reduction of discretionary practices, harmonization of classification, and verification of data through technology are likely to be effective.

Moreover, the framework recognizes that the size and direction of the reform effect depend on certain critical "Moderating Variables," including the effectiveness of the enforcement on the probability of detection and the legitimacy of the penalties imposed, the level of trust in the institutions that influences the level of compliance on the part of the importers, and the level of technology acceptability that determines the extent to which the officials and the stakeholders accept, use, and sustain the technology like NICIS II and CAPPS.

The end result of this interplay among these variables will be reflected in the Dependent Variable—optimizing customs revenue—measured in terms of improvement in the precision of revenue assessments, leakage, duty collection, and adherence to best practice. This policy-institutional-technology-behavioral approach to understanding customs revenue mobilization emphasizes that this needs to be done holistically and not piecemeal.
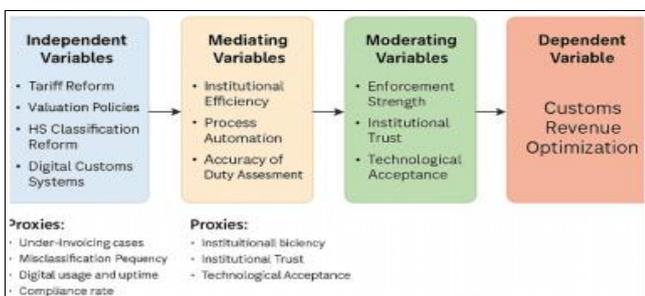
3. Methodology
3.1 Research Design
This particular research will use a qualitative approach for its research design. This will involve combining an approach for carrying out a review of policies with an analysis of cases. The review of policies will allow for an analysis of how well reforms in tariffs, valuations, digitization, and compliance contribute to revenue collection in Nigeria. The review of policies will involve an analysis of regulations, institutions, and infrastructure that govern customs revenue collection in Nigeria. This will involve an analysis of Nigeria Customs Service regulations, Nigerian Customs Service tariffs under the Common External Tariff, regulations guiding valuations, World Trade Organization guidelines for valuations, World Customs Organization Harmonized System guidelines, and regulations guiding digitization of operations such as NICIS II, CAPPS, and other digitization platforms. This will define how customs revenue collection is governed.

In addition, the study employs a multi-case study method that is used for generating research insights into the actual

manifestations of these issues. In Case 1, the focus is on evaluating the issue of undervaluation leakage at key seaports, with particular emphasis on key product categories that are considered high-risk areas for invoice manipulation. In Case 2, the focus is on evaluating misclassification patterns within chapters 39 (plastics), 85 (electrical machinery), and chapter 87 (vehicles), areas that have previously shown considerable evidence of large-scale tariff switching and misclassification fraud. In Case 3, the focus is on evaluating the NICII and CAPPS systems, while in Case 4, the focus is on evaluating enforcement and compliance patterns within the ports of Lagos. In total, these cases are used for providing an actual insight into the extent to which policy intent is either congruent or incongruent with actual practices within the customs landscape.

3.2 Data Sources
Sources for data collection for this study have been identified, and these include an integration of primary and secondary data. The primary data includes policy documents, which have been sourced from official government policy papers, NCS operating guidelines, valuation circulars, tariff schedules, the WTO agreement on customs valuation, WCO HS updates, and digitalization manuals for NICIS II and CAPPS. The above-mentioned papers offer authoritative insights into customs procedures, laws, and customs operations.

Secondary data will include peer-review articles published between 2019 and 2025 that focus on modernization of customs, valuation compliance, digital transformation, customs enforcement strategies, and revenue optimization within the Nigerian context and similar countries. Such literature will serve to enhance the analysis with additional perspectives. Newspaper articles and investigative reports will also be utilized on a selective scale to contextualize the relevance of the issues within the contemporary context. Such literature will not be utilized on a primary scale but will serve to shed light on the emerging trends that are applicable within the context.

3.3 Data Analysis Technique
The study uses qualitative content analysis, which is a scientific approach to the analysis and interpretation of content in policy documents, study cases, and literature. This approach involves the thematic coding of content to reveal patterns related to the study's concepts, which include valuation practices, tariff reforms, digital system effectiveness, and compliance. Content analysis is used to create a rich understanding of the role played by institutional and behavioral factors in determining the effectiveness of customs revenue.

To inform an evaluation of policy instruments, this study applies Walt and Gilson's (1994) policy triangle. The policy triangle entails an examination of policy through four prisms: context, content, actors, and process. The policy triangle is an appropriate tool for customs administration policy analysis due to its capacity to capture interactions among structures, interests, and implementation processes. The policy triangle helps in an analysis of why, for instance, NICIS II or Valuation Harmonization policies are yielding poor outcomes despite strong policy will.

In addition, the study uses a cross-case synthesis method, whereby the researcher compares the findings from the four case studies to identify similarities and differences in the

leakage mechanisms, enforcement strategies, and the systems' performance. This method makes the methodology more explanatory in nature, relating the micro-level operations to the macro-level policies.

3.4 Validity and Reliability
In order to ensure methodological rigor, the study incorporates several methods to ensure the validity and reliability of the findings. One such method of ensuring the validity of the findings of the study is achieved by using the method of triangulation. Triangulation of the findings of the study can be achieved by using multiple sources of literature and other relevant materials. In this respect, the findings of the study are based on the analysis of policy documents, scholarly literature, and investigative materials. In this respect, it can be stated that the findings of the study are valid and can be relied on to ensure the achievement of the objective of the study. In addition to this, the analysis of the findings of the study can be achieved by using the method of thematic analysis. In this respect, it can be stated that the findings of the study are valid and can be relied on to ensure the achievement of the objective of the study. In addition to this, the findings of the study can also be analyzed by using the method of content analysis. In this respect, it can be stated that the findings of the study are valid and can be relied on to ensure the achievement of the objective of the study. In addition to this, the findings of the study can also be analyzed by using the method of the policy triangle. In this respect.

4. Case Study Analysis
The chapter proposes five interrelated case studies that shed light on the operationalization of tariff reform, valuation practices, HS classification, digital customs infrastructures, and compliance patterns in Nigeria and comparable nations. The case studies add depth to the research by showing the operationalization of customs policy and how it affects revenue performance. The research relies on peer-reviewed literature and reports released between 2019 and 2025.
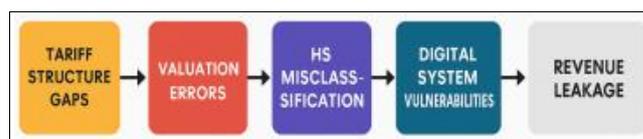

Fig 3: Customs Revenue Leakage Pathway Diagram

This diagram illustrates the sequential pathways through which weaknesses in tariff structure design, valuation accuracy, HS classification practices, and digital system integrity contribute to customs revenue leakage. It highlights how systemic vulnerabilities accumulate across operational stages, ultimately undermining revenue assurance and fiscal performance.

4.1 Case Study 1: Under-Valuation and Revenue Leakages at Lagos Seaports
Lagos seaports, such as Apapa and Tin Can Island, are the major gateways for international trade in Nigeria but are at the same time the major revenue leakage points for customs duties. Recent empirical studies have identified the seaports in Lagos as the major points for congestion, bureaucratic barriers, and valuation disputes, which are all avenues for revenue leakage and unethical practice (Oluwakoya, 2022;

de Melo, 2025) [14, 4]. Evidence suggests that the continued inefficiency in the operations of the seaports has led to the prevalence of unofficial payment channels, which undermine the valuation process.

The socioeconomic implications of maritime corruption in Nigeria's maritime trade have been well-documented, with various researchers showing evidence of widespread solicitation of "facilitation payments" at multiple points of clearance, thereby increasing transactional costs and encouraging traders to falsify invoices to cover unofficial expenses incurred during trade transactions (Adewuyi & Olamide, 2023; Ajayi, 2024). The unofficial practice further compromises the value of trade transactions since customs officials are likely to intentionally lower their assessments for bribes, and traders are likely to take advantage of this weakness to avoid taxes. The maritime trade, therefore, presents an illustration of an interplay between policy failure in trade valuation, poor institutional response, and non-compliance.

This case, therefore, becomes crucial to the study, as it highlights the significance of valuation inconsistencies, behavioral determinants for non-compliance, and the need for strong systems to constrain discretion. In addition, it will be instrumental in analyzing whether digital systems for valuation, which were incorporated in recent reforms, help to address historical leakages.

4.2 Case Study 2: HS Misclassification in High-Risk Chapters 39, 85, and 87

Harmonized System (HS) Chapters 39 (plastics), 85 (electrical machinery), and 87 (vehicles) are recognized globally for their risk factors, which are attributed to the complex nature of the headings, the relatively high tariffs, and the likelihood that these headings are susceptible to tariff evasion. These have been recognized and documented by the World Customs Organization publications and various country schedules, which have noted that the headings are susceptible to classification errors, which are exacerbated in developing economies (WCO, 2022; Nigeria Customs Service, 2023) [16, 11].
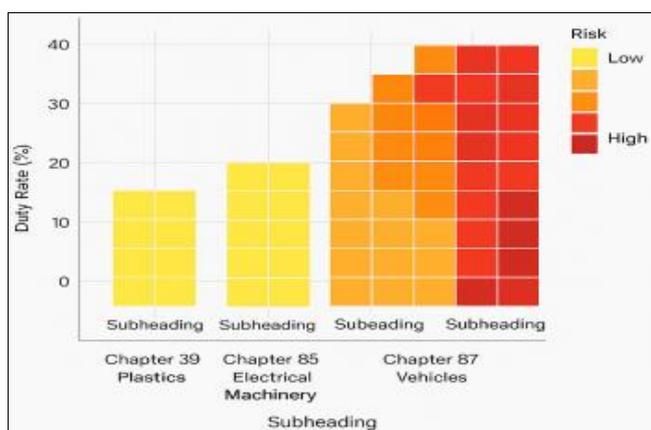
Fig 4: HS Misclassification Risk Heat Map for Chapters 39, 85, and 87

This heat map visualizes the relative risk of tariff misclassification across HS Chapters 39 (Plastics), 85 (Electrical Machinery), and 87 (Vehicles). Higher-risk segments—shown in deeper orange and red—indicate subheadings where duty differentials, product complexity, and classification ambiguity significantly increase the

likelihood of misclassification and associated revenue losses.

According to empirical and peer-reviewed literature, minor changes in nearby HS codes within these chapters have a significant effect in altering duty rates, thereby providing an incentive for misclassifications. In Nigeria, customs circulars and import guidelines have listed plastics, automobile parts, and electrical materials among those most often disputed, with classification disputes often resulting in post-clearance upliftments, seizures, or reassessments.

This case lends itself to a micro-level examination of the role that classification reform plays in revenue optimization. Some of the pertinent issues that need to be considered include the extent to which post-clearance audits identify misclassifications in these high-risk chapters, as well as whether there have been any significant improvements resulting from the implementation of updated HS explanatory notes and officer training programs. This case highlights the interconnectivity between HS classification, valuation, digital decision support systems, and other modernization efforts.

4.3 Case Study 3: NICIS II, CAPPS and Digital Customs Modernization in Nigeria
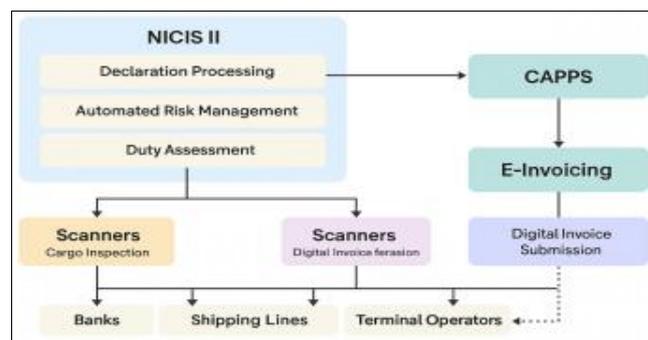
Fig 5: Digital Customs Architecture Map (NICIS II, CAPPS, Scanners, and E-Invoicing)

This diagram illustrates the integrated structure of Nigeria's digital customs environment, highlighting how NICIS II, CAPPS, scanners, and the e-invoicing system interact to support declaration processing, automated risk management, duty assessment, document verification, and cargo inspection. The architecture emphasizes the flow of data among customs, banks, shipping lines, and terminal operators to enhance transparency and revenue assurance.

Digitalization of revenue performance in developing economies has been acknowledged as one of the major means of improving revenue performance. The use of NICIS II, CAPPS, and other e-Customs modules in Nigeria can be regarded as one of the biggest interventions aimed at improving efficiency, reducing manual interventions, and minimizing revenue loss. Research findings on digitalization in NCS have indicated improvements in data, audits, and transparency, as noted in recent literature (Ojo & Fasona, 2022; Khalil & Amein, 2023) [12, 8].

Empirical research conducted on the operation of Nigeria Customs Service Zone A in the year 2023 showed that automation was positively correlated with increased assessed revenues, clearance speed, and minimized discretionary interference in valuation and examination (Ezenwa & Okereke, 2023) [6]. However, despite these positive outcomes, issues that are yet to be addressed

include inadequate scanner resources, system downtime, and areas where automation is circumvented.

This particular case study is highly relevant to the operationalization of the study's digital customs construct. The study illustrates the importance of NICIS II and CAPPS in facilitating the effectiveness of valuation referencing, the accuracy of the HS classification system, the validation of the e-payment system, as well as risk-based inspections while at the same time highlighting the systemic barriers to the achievement of the advantages that come with digitalization. It, therefore, presents a comprehensive foundation for the integration of the concepts surrounding the Technology Acceptance Theory, capacity perspectives, and revenue optimization.

4.4 Case Study 4: Enforcement and Compliance Behaviour at Lagos Ports

Traders' compliance behavior can be affected by a combination of factors that include deterrence effects, institutionalized trust, transaction costs, and the fairness of customs procedures. In the recent systematic reviews on tax and customs non-compliance, economic incentives, the severity and likelihood of sanctions, and the clarity of procedures have been identified as critical determinants of compliance outcomes (Adewuyi, 2021; Essien, 2024) [3, 5]. These factors are more visible within the context of the Lagos port environment that combines digitalization with governance issues.
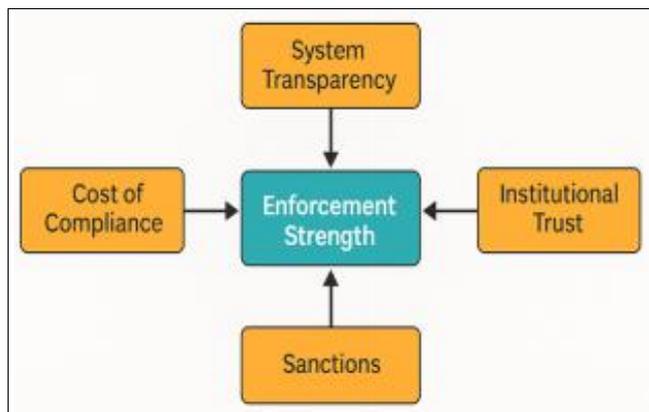
Fig 6: Compliance Behaviour Determinants Model

This model illustrates the key factors influencing importer compliance behaviour in Nigeria's customs environment. Enforcement strength is shaped by system transparency, institutional trust, cost of compliance, and the credibility of sanctions. The model highlights how behavioural, institutional, and procedural factors interact to determine the likelihood of voluntary compliance or evasion.

Previous research on the Nigerian port system shows that while initiatives like NICIS II and better information exchange have helped to ease the flow of trade, problems like congestion, procedural inconsistency, and lingering issues of corruption all contribute to the lack of voluntary compliance (Okoye & Nwankwo, 2022 [13]; Badiora, 2023). Research into the effectiveness of time release and risk management initiatives at ports like Tin Can and Apapa shows that while the effectiveness of post-clearance audits and stricter sanctions on importers has helped to change importers' behaviour, the progress achieved so far has been inconsistent (Olatunji & Daramola, 2023).

This case is important because it relates compliance behavior to Deterrence Theory and Institutional Theory. The case shows that customs processes, probabilities of enforcement, and institutional credibility interact to determine the likelihood of undeclaration, mis-declaration, or smuggling.

4.5 Case Study 5: Comparative Digital Customs Experiences in Ghana and Rwanda

Seeking external validation, a comparative case study will identify relevant lessons that have implications for Nigeria's digital customs reforms. In the case of Ghana, the introduction of the Integrated Customs Management System (ICUMS) at Tema Port was linked to improvements in customs clearance, transparency in valuation, and revenue collection; however, there were teething problems with the implementation, which impacted initial success, as highlighted in other literature such as Bokpin & Abbey (2021) and Tetteh (2022). This shows that, notwithstanding digitalization, governance and change processes play a crucial role.

Another case in point is Rwanda, where its Electronic Single Window, or ReSW, is often held up as an exemplar of integrated digital customs clearance in Africa. Empirical analysis suggests that this initiative has had a significant impact in reducing clearance times, increasing predictability around clearance times, and providing greater consistency in terms of revenue performance. The success of Rwanda in this regard is often seen as being driven by strong coordination across its trade and customs landscape.

The comparative case serves to highlight the significance of matching digitalization with institutional maturity, inter-agency working, and performance monitoring. It is additionally used for benchmarking purposes, providing an assessment of the extent to which Nigeria's reform effort may deliver similarly effective outcomes.

Overall, the five studies contribute to the understanding of the multidimensionality of the optimization of customs revenue in Nigeria. Under-valuation and misclassification at the ports in Lagos emphasize the need for the improvement of valuation governance and the accuracy of the HS classification. NICIS II and CAPPS suggest the benefits associated with digitalization, which need to be complemented by institutionalization and user acceptance. Compliance is still driven by deterrence and institutional trust, and the cross-country analysis confirms the need for integrated reform including digitalization, governance, and monitoring in Ghana and Rwanda.

Collectively, these cases offer empirical support for the policy review approach used in this study and reinforce the need for simultaneous improvement of valuation accuracy, tariff integrity, digital modernization, and compliance behavior to drive customs revenue performance.

5. Findings and Discussion
It has also shown that the role of the reform has been moderate in the country's efforts towards optimizing revenue collected at the custom points. For example, the analysis of policy and cases under this study has shown that the reform has moderately improved the predictability and minimized the classification issues; however, the issues associated with the escalation and prohibition have continued to distort the import flows and provide the necessary push for evading the system (Adewuyi, 2021 [3];

Mutuku & Wanjiru, 2021). For example, the use of higher bands for vehicles and certain electronic devices has continued to promote the importation of the same products to the neighboring countries and the consequent smuggling, which has undermined the revenue-optimization efforts at the borders, which are porous (Mensah & Tetteh, 2021) [9].

Valuation policy initiatives, particularly those which support the World Trade Organization Agreement on Customs Valuation, have shown mixed outcomes in the development and enhancement of revenue assurance strategies. Even though the adoption and implementation of the principle of transaction value have enhanced the transparency and understanding of the valuation process, the practical implications have shown that errors in the valuation process arise due to under-invoicing, the differential and subjective use of reference value, and the upliftment of the invoiced value. Under-invoicing has been the most significant form of valuation fraud, particularly for product categories that have higher differences in duty rates, including automobiles, plastic goods, and electrical goods. Moreover, the lack of uniform valuation standards and the discretionary use and interpretation of supporting documentation have shown that the valuation process is often subjective and disputed. These observations have been consistent with global studies showing that the consistency and uniformity in the valuation process are often challenging for countries in the development stage due to the institutional limitations and information asymmetry between the trading community and the customs administrations.

Similarly, incremental gains have been made in regards to Harmonized System classification reform. Nevertheless, major challenges still persist. For instance, based on case studies for Chapters 39, 85, and 87, errors in classification, which may be deliberate or unintended, have been shown to lead to major revenue losses. The case studies revealed that errors in customs classification often occur where minor variations in subheadings lead to major variations in customs duty. The desire for revenue evasion often prompts traders to misclassify products. The analysis of clearance audit records revealed that a major percentage of revenue reassessments and demand notice records was due to errors in customs classification. Therefore, despite incremental gains having been made in regards to officer training and dissemination of updated World Customs Organization explanatory notes, as well as incorporating customs duty decision-support tools in NICIS II, which have improved customs duty accuracy and revenue predictability, classification accuracy remains key for proper customs duty application.

Digital systems, such as the NICIS II, CAPPS, and cargo scanners, have yielded significant benefits in terms of increased transparency and monitoring. For instance, the digitalization of declaration processing, valuation referencing, electronic payment systems, and risk-based inspection systems have minimized the risk of human intervention, thereby reducing the potential for collusion and fraud (Ojo & Fasona, 2022; Khalil & Amein, 2023) [12, 8]. Countries that have totally digitalized the NICIS II systems are experiencing increased revenue collection on a monthly basis, mainly because of automation and the minimization of leakage points (Ezenwa & Okereke, 2023) [6]. However, there are digitalization challenges related to the downtime of the systems, the speed of the network, the failure of scanners, and the circumvention of the systems, which

undermine the reliability of digital systems and the potential for the resurgence of discretionary systems. The study therefore confirms the argument that digital systems are the cornerstone for the effective running of a modern customs administration but are subject to the effectiveness of institutional systems and stakeholder acceptance. Compliance behavior on the part of importers also continues to be an important factor that shapes the revenue outcomes at customs. The study establishes that the probability of customs enforcement, the level of fairness, procedural predictability, and the level of trust that importers have in the customs institution all significantly influence the level of compliance (Adewuyi, 2021; Essien, 2024) [3, 5].

Where the probability of customs enforcement is low, and the level of valuation variability exists, the relative gains to noncompliance as opposed to the probability of risk to the trader also rises. The experience at the ports in Lagos reflects the negative effect that the level of congestion, the payment of bribes, and the inconsistent nature of customs procedures have on the level of trust that importers have in the customs administration, leading to a higher level of noncompliance (Okoye & Nwankwo, 2022) [13].

However, environments characterized by transparent procedures, the use of technology to facilitate customs procedures, and the threat of penalties have a higher level of compliance. The above-mentioned customs environments align with the theoretical propositions that customs compliance can be viewed as a behavioral and institutional construct that reflects the interplay between incentives Through cross-case synthesis, several patterns have been identified that have a bearing on the revenue issues affecting customs revenue in Nigeria. Firstly, there has been a discovery that tariff structures, valuation practices, HS classification, digitalization, and compliance have a high level of interrelation; thus, any challenge affecting any of the factors has a high probability of affecting the others. Secondly, digitalization has been observed to have the highest impact on the revenue optimization process; however, the impact has been constrained by the need to address the bottlenecks. Thirdly, misclassification and valuation have been observed to have the highest impact on revenue leakage. In comparison with the Ghana and Rwanda cases, there has been a discovery that revenue optimization requires the use of digitalization tools alongside effective coordination among the revenue institutions.

Fig 7: Cross-Case Comparative Dashboard: Lagos Ports, NICIS II Rollout, HS Misclassification, and Enforcement Behaviour

This dashboard synthesizes key performance indicators, leakage risks, and reform impacts across four critical case areas of Nigeria's customs system. It highlights how operational inefficiencies, digital automation levels, classification accuracy, and enforcement practices collectively shape revenue outcomes and inform targeted policy interventions.

6. Policy Implications

The findings of this study suggest the need for the development of a comprehensive and multidimensional policy approach to enhance the customs revenue architecture of Nigeria. One of the findings of this study was the need for the urgent strengthening of the valuation oversight function, with the findings revealing that the major sources of customs revenue loss remain under-invoicing and subjective upliftment. In this respect, the strengthening of the customs valuation oversight function can only be achieved by the development of unified valuation systems, improving customs officers' access to international sources of customs valuation reference materials, and the compulsory adoption of automated customs valuation support tools by customs administrations using the NICIS II platform. From the empirical findings of this study, it was revealed that the consistency of customs valuations can be significantly achieved if customs administrations develop and adopt centralized customs systems with automated systems and processes (Adeoye & Adigun, 2021; Nguyen & Tran, 2023) [2, 10]. In addition, the strengthening of the customs valuation oversight function can also be achieved by curtailing customs officer discretion and enhancing internal customs audit processes and penalties for customs officers and customs traders.

The other significant implication revolves around the need to improve HS classification training and technical expertise for officers in the Nigeria Customs Service. Inconsistencies in classification, especially for high-risk chapters such as plastics, electrical machinery, and vehicles, have significant revenue implications. Therefore, there is a need to improve classification accuracy, which would be achieved mainly through continuous professional training, disseminating updated WCO explanatory notes, and implementing digital HS classification support systems. Literature shows that countries that invest heavily in continuous training for customs officers, as well as digital support for HS classification, tend to record significant improvements in reducing classification and valuation disputes. This would, therefore, improve revenue predictability for Nigeria, as well as strengthen Nigeria's credibility in international trade compliance.

A third implication revolves around the deepening digital integration among border controls using a National Single Window that functions optimally. For instance, the current fragmented nature among customs departments, port authorities, terminal operators, quarantine departments, among others, has created avenues for manipulations. However, the world over has shown that the use of Single Window improves transparency and expedites the clearance process while reducing leakages through the sharing of information among all the departments involved (Khalil & Amein, 2023; Habimana & Rwirahira, 2023) [8, 7]. In the context of the Nigerian economy, the transition from a partially digitized environment to a single National Single Window would enhance the ability to better manage risks and eliminate information asymmetries that have been exploited by the current operators.

Finally, the study underlines the critical implications for behavioral compliance interventions, which recognize that compliance is not only driven by the likelihood and consequences of detection and enforcement but also by the perceptions and incentives for compliance held by the traders. Empirical studies have shown that behavioral approaches can have a significant impact on improving compliance rates among traders. These include compliance nudges, communication strategies, simplification of procedures, and the design and delivery of incentives for compliant traders. These can have a significant impact on improving compliance rates among traders, as shown in the studies by Essien (2024) [5] and Adewuyi (2021) [3]. These can be complemented by the design and delivery of credible enforcement and penalty regimes for non-compliant traders, which can help to make the risks and incentives for under-valuation, mis-classification, and smuggling less attractive. Building trust among traders has also been shown to have a positive impact on compliance behavior. Collectively, these policy implications highlight that for Nigeria Customs revenue performance, an integrated reform strategy is needed for its customs revenue. This is because addressing reform in any of these areas in isolation is inadequate for improvement. Instead, an integrated approach is needed for institutional improvement, along with concerted reform efforts for modernizing technology and human behaviour.
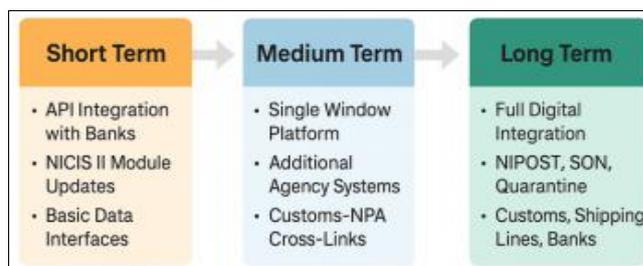
Fig 8: National Single Window Integration Roadmap

This roadmap outlines the phased progression toward full inter-agency digital integration in Nigeria's trade environment. It identifies short-term actions (API integration and NICIS II upgrades), medium-term milestones (Single Window platform development and expanded agency linkages), and long-term goals (complete digital interoperability across Customs, NPA, NIPOST, SON, Quarantine, shipping lines, and banking systems).

7. Conclusion and Recommendations
7.1 Conclusion

The research shows that for customs revenues in Nigeria to be maximized, a holistic reform strategy that deals with the multifaceted issues of customs tariff management, valuation governance, HS codes accuracy, digitalization, and importer compliance is essential. While customs reform is vital for providing a stable framework for revenues, its effectiveness is hindered by valuation issues and misclassification. For example, the continued trend of undervaluation, customs duty manipulation, and misdeclaration points to the necessity for better institutions that are effective in limiting discretionary powers while encouraging uniformity.

Digital technologies such as NICIS II and CAPPS have significant potential for increasing transparency and

auditability and reducing fraud opportunities. However, their potential is limited by infrastructural limitations, integration challenges, and resistance to change among stakeholders. In addition, compliance behavior is influenced not only by the level of enforcement, but also by perceptions of procedural justice and customs administration. The experience of Ghana and Rwanda suggests that for customs administration to be effective, it must be integrated across all agencies managing customs.

Overall, the results demonstrate the impossibility of attaining a sustainable revenue mobilization strategy in a fragmented manner. Rather, a comprehensive modernization program, which encompasses valuation oversight, classifications, digital harmonization, and behavioral compliance strategies, is necessary to position the Nigerian customs administration for a role in driving a sustainable revenue stream.

7.2 Recommendations

To advance the reform trajectory and achieve meaningful improvements in revenue assurance, several strategic recommendations are proposed:

Implement a fully automated valuation decision-support system

A centralized, AI-enabled valuation tool integrated within NICIS II should be adopted to reduce subjective assessment and minimize officer discretion. Such a system must incorporate global price references, domestic benchmarks, and predictive analytics to detect anomalies in real time.

Develop harmonized tariff and valuation databases

Establishing a unified platform that consolidates tariff schedules, HS classification notes, valuation reference documents, and post-clearance audit findings will enhance consistency across commands and reduce classification and valuation disparities.

Strengthen real-time digital integration with external stakeholders

Customs systems should be linked via secure APIs to banks, terminal operators, shipping lines, port authorities, and other regulatory agencies to eliminate data silos and facilitate real-time cross-verification of documents, payments, and cargo movements.

Mandate e-invoicing for high-risk product categories

Products historically associated with under-valuation—such as vehicles, plastics, and electrical machinery—should be subject to compulsory electronic invoice validation to authenticate transaction values and reduce invoice fraud.

Implement risk-based compliance programs for importers

A tiered compliance model that differentiates importers based on historical behaviour should be established. High-risk traders should face stricter scrutiny, while compliant traders benefit from expedited clearance, thereby incentivising good behaviour and improving overall compliance culture.

Enhance officer training in valuation and HS classification

Continuous professional development—supported by updated WCO guidelines and digital classification tools—will reduce errors, improve accuracy, and strengthen institutional capacity.

Deepen the development of a National Single Window.

A fully integrated Single Window platform will streamline processes, harmonize regulatory functions, and significantly reduce clearance times, fraud risks, and administrative burdens.

Together, these recommendations form an integrated strategy capable of strengthening Nigeria's customs administration, enhancing revenue mobilization, promoting institutional transparency, and aligning the country with global best practices in border management and trade facilitation.

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