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Comparative analysis of customs frameworks for aviation logistics: Brazil versus global benchmarks.

Comparative analysis of customs frameworks for aviation logistics: Brazil versus global references
Comparative analysis of customs marks for aeronautical logistics: Brazil against global references

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Summary

This article analyzes, from a historical-evolutionary and technical-scientific perspective, the customs frameworks applicable to international aeronautical logistics, with an emphasis on critical *Aircraft on Ground* (AOG) operations[1] and regulatory compliance. The study establishes a comparison between the Brazilian customs system and international reference models, observing that the latter, anchored in the guidelines of the International Civil Aviation Organization (ICAO) and the World Customs Organization (WCO), prioritize trade facilitation, risk management, and digital integration. It concludes that, although Brazil has advanced through initiatives such as the Single Window for Foreign Trade and the Authorized Economic Operator (AEO) Program, structural challenges related to regulatory complexity, institutional fragmentation, and operational predictability still persist.
Keywords: aviation logistics; AOG; customs compliance; trade facilitation; risk management; digitalization.

1. Introduction

International aviation logistics integrates highly regulated supply chains characterized by severe time constraints, in which delays in the availability of parts, components, or technical documentation can directly compromise the operational continuity of aircraft and the regularity of air transport. Specialized literature on operations and maintenance highlights that the aviation sector operates under high standards of reliability and safety, so that logistical failures, even if isolated, tend to generate significant systemic impacts, both from an economic and operational point of view (ALOMAR; NIKITA, 2025; YADAV; KULKARNI; YAO, 2022).

In this context, situations known as Aircraft on Ground (AOG), characterized by the unavailability of an aircraft due to technical failure or an urgent need for a critical component, material, or service, are recognized as events of maximum logistical criticality. Recent studies describe AOG as an availability problem associated with high direct and indirect costs, including lost revenue, rescheduling of flight networks, contractual impacts, and reputational effects, reinforcing that the speed in replacing parts and executing associated procedures is a determining factor for the operational performance of airlines (ALOMAR; NIKITA, 2025; YADAV; KULKARNI; YAO, 2022).

In global supply chains such as aviation, an efficient response to AOG events depends not only on technical maintenance capabilities and demand forecasting, but also on logistical and regulatory processes capable of enabling the urgent international movement of air cargo.
At this stage, customs milestones assume a strategic role by conditioning the timing, predictability, and stability of goods clearance, especially in time-sensitive flows. The literature on trade facilitation recognizes that excessively complex, fragmented, or unpredictable customs procedures increase compliance costs and the risk of delays, with negative effects on the performance of global supply chains (OECD, n.d.; WTO, n.d.).

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The concept of trade facilitation is defined by multilateral organizations as the set of measures aimed at simplifying, harmonizing, and streamlining technical and legal procedures at the border, with the goal of reducing trade costs and mitigating regulatory bottlenecks. The Organisation for Economic Co-operation and Development highlights that improvements in border processes, particularly through digitalization and institutional integration, are associated with reduced clearance times, increased supply chain resilience, and strengthened operational predictability (OECD, n.d.).

In the sectoral regulatory framework for air transport, the International Civil Aviation Organization establishes, through Annex 9 – Facilitation, a set of Standards and Recommended Practices aimed at reducing formalities, standardizing documentation, and simplifying procedures for the entry, exit, and release of aircraft, passengers, and cargo. The text of Annex 9 itself explicitly states that these measures have the historical purpose of reducing operational delays resulting from excessive administrative requirements and promoting coordination between multiple border authorities, including customs, immigration, and health authorities, in order to ensure greater fluidity in international air transport (ICAO, 2017).
In a complementary manner, the modernization of customs regimes, with a direct impact on aviation logistics, has developed within the framework of the World Customs Organization, especially through the Revised Kyoto Convention. The WCO describes the RKC as a “blueprint” of modern customs procedures, structured on principles such as transparency and predictability of customs actions, standardization and simplification of documentation, maximum use of information technology, minimum necessary control, risk management, audit-based controls, and interagency coordination. These principles are particularly relevant to aviation logistics flows, where the balance between control and speed is a central element (WCO, n.d.).

In the multilateral trade arena, the World Trade Organization's Trade Facilitation Agreement explicitly incorporates the agenda of digitalization and administrative integration by stipulating, in its Measure 10.4, that Members should endeavor to establish or maintain Single Window systems. According to the text of the agreement, such systems should allow the submission of data and documents through a single point of entry, avoid duplicate requests for information already received, and use information technology to support regulatory processing—essential elements for reducing documentary friction and increasing predictability in international operations (WTO, n.d.).

The practical relevance of these regulatory instruments is reinforced by empirical evidence from international experiences. The TradeNet case study, Singapore's single-window system documented by UNECE, demonstrates that integrated digital architectures and interagency coordination can significantly reduce regulatory response time, with large-scale electronic processing and turnaround times measured in minutes for most requests. While such results cannot be automatically generalized to all national contexts, the case illustrates the potential of digital integration to mitigate regulatory bottlenecks in time-sensitive supply chains (UNECE, n.d.).

In Brazil, the customs modernization agenda has followed a trajectory convergent with these international guidelines, especially through the implementation of the Single Window for Foreign Trade Program.
The program is presented by the federal government as an instrument designed to reduce bureaucracy, time, and costs in foreign trade operations, creating a "single window" to centralize interaction between private operators and the State. Regarding imports, this involves the progressive introduction of the Single Import Declaration (DUIMP) within the Single Window environment.
This highlights the transition to integrated digital processes, aligned with the Single Window model (RFB, n.d.; BRAZIL, 2024).
Despite these advances, institutional and sectoral analyses indicate that structural challenges persist in the Brazilian system, associated with regulatory complexity, the multiplicity of regimes, and...

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Procedures, institutional fragmentation, and variability in operational predictability are all limitations. These limitations tend to become more evident in highly critical scenarios, such as AOG events, where regulatory delays significantly increase operational costs and compromise logistical response. In this sense, comparing Brazil with global benchmarks is fundamental to understanding how different regulatory and digital architectures condition aeronautical logistics performance in emergency contexts.

2. Historical evolution of customs milestones applicable to aviation.

The evolution of customs regulations applicable to international aviation logistics is directly related to this evolution. related to the consolidation of the legal framework for civil air transport and progressive modernization of customs administrations in the post-World War II period. The need to guarantee fluidity to international air transport, in a context of expanding commercial traffic and passengers, led to the construction of an institutional framework oriented simultaneously to safety, standardization, and the reduction of operational delays associated with excessive formalities. (ICAO, 2017).

The contemporary institutional basis for international civil air transport was established with the signing of the Convention on International Civil Aviation, on December 7, 1944, instrument which gave rise to the regulatory system of modern civil aviation. Due to the ratification process, The Provisional International Civil Aviation Organization was initially created, which preceded the The formal constitution of the International Civil Aviation Organization took place in 1947. From that milestone onwards, the ICAO has come to play a central role in harmonizing technical and operational rules of international air transport, including with regard to facilitating the traffic of aircraft and people. and cargo (ICAO, 2017).

In the specific context of facilitation, ICAO operationalized its objectives through Annex 9 – Facilitation, which brings together Standards and Recommended Practices aimed at reducing barriers. administrative processes, standardization of documents, and simplification of entry and exit procedures. and clearance associated with international air transport. Annex 9 itself acknowledges that delays Excessive formalities generate costs for operators, airports, and users, which is why... whereby facilitation is treated as a structural element of operational efficiency. Furthermore, the The document highlights that the effectiveness of these measures depends on coordination between multiple parties. border authorities, including customs, immigration and health agencies (ICAO, 2017).

While ICAO was structuring the sectoral framework for civil aviation, the modernization process of Customs regimes have developed more broadly within the framework of the World Customs Organization. The WCO, originally created as the Customs Cooperation Council, went on to promote the Harmonization and standardization of customs procedures with the aim of facilitating trade.

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international relations without compromising state controls. This agenda is particularly relevant to the Aeronautical logistics, since aeronautical components are frequently subject to controls. Specifics depend on predictable customs procedures and technical alignment between countries. (WCO, n.d.).

At the end of the 20th century, the entry into force of the revised Kyoto Convention represented a milestone. crucial for the transition towards so-called "modern customs". The WCO describes the RKC as a “blueprint” of contemporary customs procedures, based on principles such as Transparency and predictability, standardization and simplification of documentation, maximum use of technology. of information, minimum necessary control, risk management, audit-based controls and Coordination with other border agencies. The adoption of the revised 1999 version and its entry into The laws in force in 2006 formalized, at the international legal level, the reconciliation between facilitation and control. (WCO, n.d.).

These principles are especially relevant to aviation logistics because they connect efficiency... procedural to the notion of risk-based control, an indispensable element in urgent and complex workflows. high technical value, such as those involved in AOG operations. By shifting the emphasis from physical control With a systematic approach to risk analysis and subsequent audit mechanisms, RKC provides the basis. A conceptual solution to expedite the release of low-risk cargo without compromising customs supervision. (WCO, n.d.).

At the beginning of the 21st century, the evolution of customs milestones began to explicitly incorporate... The security agenda for the logistics chain and the partnership between customs and the private sector. In this context, the WCO adopted the SAFE Framework of Standards in 2005, with the aim of promoting Simultaneously, it aims to secure and facilitate global trade. In 2007, the concept was introduced. Authorized Economic Operator, establishing the paradigm of reliable operators, to whom Procedural benefits are granted conditional upon demonstrating high standards of Compliance and internal control (WCO, n.d.).

Alongside the consolidation of models based on risk management and reliable operators, Internationally, the concept of Single Window as an instrument of Administrative streamlining and digitalization of foreign trade. Organizations such as UNECE. They define the single window as a mechanism that allows for the single submission of information and Regulatory documents can be accessed through a single point of entry, reducing compliance costs. and procedural barriers. UNECE Recommendation No. 33 consolidated this concept as International guideline for modernizing border processes (UNECE, n.d.).

At the binding multilateral level, the World Trade Organization's Trade Facilitation Agreement Trade formally incorporated this agenda by establishing, in its Measure 10.4, that Members

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They should make efforts to implement or maintain Single Window systems. The text of the agreement
It emphasizes the elimination of duplicate documents, the use of information technologies, and notification.
timely delivery of submission results, creating an international standard for integration and
regulatory interoperability (WTO, n.d.).

The practical relevance of these instruments is frequently illustrated by international experiences.
cited as references, such as Singapore's TradeNet system. The case study documented by
UNECE describes an integrated digital single window model that connects private operators and
government authorities, recording a high volume of electronic processing and deadlines of
significantly reduced regulatory response. Although the observed results depend on a
In this specific institutional context, the case demonstrates the potential of digital integration and coordination.
interagency cooperation to reduce regulatory bottlenecks in time-sensitive supply chains (UNECE, n.d.; WCO,
sd).

In Brazil, the historical trajectory of customs milestones has traditionally been marked by a strong emphasis.
in control and collection, with gradual modernization through digitization initiatives and
Integration. In the most recent period, this movement has materialized primarily in the implementation of the
Single Window for Foreign Trade Program, aligned with the single window logic advocated in forums.
multilateral. The transition to digital declarations, such as the DUIMP, highlights the incorporation
progressive application of the principles of simplification, systemic integration, and risk management, even though
challenges of institutional consolidation and procedural standardization persist (OECD, n.d.;
WTO, n.d.).

In summary, the historical evolution of customs regulations applicable to aviation logistics can be summarized as follows:
understood as a trajectory characterized by: (i) institutionalization of the legal regime of
international civil aviation from the Chicago Convention and the creation of ICAO; (ii) consolidation
of sectoral facilitation principles through Annex 9; (iii) customs modernisation oriented towards
Simplification, information technology, and risk management with the Revised Kyoto Convention; and
(iv) contemporary maturation of integrated control and facilitation models, based on
reliable operators and digitization through Single Window (ICAO, 2017; WCO, n.d.; UNECE,
sd; WTO, sd).

3. Brazilian customs structure: complexity and modernization initiatives

The Brazilian customs structure as applied to foreign trade and, consequently, to logistics.
Aeronautics is characterized by an institutional design marked by the coexistence of multiple
special customs regimes, procedural layers of authorization and a systemic architecture in

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transition to more integrated and digital models. This arrangement reflects a historical tradition of strong emphasis on control and collection, combined with recent modernization efforts driven by information technologies and risk management (OECD, n.d.; WTO, n.d.).

In the context of aviation logistics, this regulatory complexity takes on particular relevance, a Given that operations in this sector often involve goods of high technical value, special regimes apply. of admission or industrialization and urgent flows associated with maintenance and return of Aircraft in service. The literature on trade facilitation points out that customs systems Excessively fragmented systems tend to increase compliance costs, and the need for... Regulatory specialization on the part of operators and reduced operational predictability are factors. which become critical in time-sensitive supply chains (OECD, n.d.).

3.1 System enablement and access layer: Siscomex

Even before the use of special customs regimes, import and export operations In Brazil, this presupposes that operators are qualified to access official trading systems. external markets, particularly the Integrated Foreign Trade System (Siscomex). The Federal Revenue Service describes the qualification as a prerequisite intended to allow importers, exporters and other stakeholders register and monitor operations in the system modules, conditioning the The exercise of activities is subject to registration regularity and compliance with regulatory requirements. specific (RFB, n.d.).

This requirement has a direct impact on aviation logistics, as critical operations, such as those associated with aviation, are affected. AOG events depend not only on transportation and the physical availability of parts, but also the operator's ability to formally register, process, and complete operations in the system. customs. The existence of this procedural layer implies that logistical predictability is linked not only to transport efficiency, but also to prior and ongoing compliance with the rules for qualification and systemic control (RFB, n.d.).

3.2 Special customs regimes relevant to aviation logistics

In the aviation sector, special customs regimes play a central role by enabling... legal framework for operations compatible with specific operational needs, such as Temporary entry of goods for maintenance, repair, industrial processing, and subsequent export. The Revenue Service The Federal government organizes these systems into its own manuals and guidelines, highlighting the multiplicity of...

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available instruments and the need for appropriate selection and management of the applicable regime, according to the purpose of the operation (RFB, n.d.).

3.2.1 Temporary Admission

The Temporary Admission regime in Brazil is governed by specific regulations and described by... The Brazilian Federal Revenue Service acts as a mechanism for the entry of goods into the national territory, with suspension. total or partial tax exemption, provided that it is intended for a fixed term and for specific purposes. previously defined. The Temporary Admission Manual emphasizes the need for control. strict adherence to the timeframe, purpose, and termination of the regime, structuring the topic into modalities. such as total suspension, economic use and active improvement (RFB, n.d.).

This regime is particularly relevant to aviation logistics as it covers goods entering the country. in the country for maintenance, repair or temporary use, recurring situations in the sector. The literature Regulatory guidelines indicate that, although the regime provides tax benefits, its operationalization... This requires a high degree of document control and monitoring, which can impact the time involved. response in emergency scenarios if procedures are not properly integrated (RFB, sd).

3.2.2 Drawback

Drawback is defined by the Brazilian customs administration as a special regime established with the aim of encouraging exports, allowing the suspension, exemption or refund of taxes levied on imported inputs used in the manufacture of products intended for export. The Federal Revenue Service describes the different modalities of the regime and highlights the need compliance with formal requirements and proof of the final destination of the goods (RFB, n.d.).

Although drawback is traditionally associated with the export industry, its operation is relevant to aeronautical logistics in supply chains involving maintenance, industrialization and supply of components with an export focus. In these cases, the regime can contribute to The organization of the supply flow, provided that the operators are able to manage the controls and deadlines. required, which reinforces the importance of regulatory predictability (RFB, n.d.).

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3.2.3 Recof and Recof Sped

The Special Customs Regime for Industrial Warehousing under Computerized Control (Recof) is described by the Federal Revenue Service as an instrument that allows the importation or acquisition on the market Internal transport of goods, with suspension of taxes, under computerized customs control, for subsequent industrialization destined for export or the domestic market. The regulation of the regime It establishes qualification requirements, systemic control, and continuous monitoring of operations. (RFB, n.d.).

The evolution of Recof includes the Recof Sped modality, whose control logic is based on integration. with the Public Digital Accounting System. This link reinforces the centrality of technology. information in the management of the regime and highlights the convergence of the Brazilian system with principles international standards for computerized control and post-audit procedures, as advocated by Revised Kyoto Convention (WCO, n.d.; RFB, n.d.).

The relevance of Recof to aeronautical logistics stems from the regulatory recognition of Aircraft maintenance and repair operations are considered activities compatible with the regime, provided that that the specific requirements are met. This framework demonstrates an attempt to align customs instruments adapted to the operational realities of the sector, even though their practical application requires a high level of compliance and management capacity on the part of the operators (RFB, n.d.).

3.3 The cost of complexity: documentation, coordination and predictability

The multiplicity of customs regimes and procedural pathways in Brazil implies an increase significant volume of documentation, need for regulatory specialization, and interaction with different administrative instances. From the point of view of regulatory governance, the literature This indicates that complex systems tend to increase compliance costs and amplify the risk of... Delays, especially when operations involve urgency and low tolerance for failure, as in aeronautical flows (OECD, n.d.; WTO, n.d.).

Furthermore, the need for coordination between different regimes, systems, and authorities may reducing operational predictability when there is no full system integration. In scenarios such as In AOG (Applied Out-of-Gen) environments, where response time is a critical factor, procedural fragmentation can amplify... The economic impact of the delays is significant, highlighting the importance of reforms. geared towards simplification and interoperability (OECD, n.d.).

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3.4 Recent modernization initiatives: Single Portal, DUIMP and single window.

In response to these challenges, Brazil has been implementing, since the mid-2010s, the
The Single Window for Foreign Trade Program, designed as a simplification tool,
Digitization and integration of import and export processes. The program is presented by
federal government as an initiative aimed at reducing bureaucracy, time and costs, as well
such as the creation of a single window to centralize interaction between private operators and the State.
(BRAZIL, 2024).

In the area of imports, the introduction of the Single Import Declaration is one of the main...
vectors of this modernization. The DUIMP is described by the Federal Revenue Service as a declaration formulated
within the Single Portal environment, integrating information previously scattered across different documents and
systems and operationalizing a control logic based on structured data, technology of
Information and risk management (RFB, n.d.).

Institutional communications related to the migration of imports to the Single Window indicate
Expected gains include a significant reduction in paper use and interoperability in data exchange.
certificates, joint inspections and the use of licenses for multiple operations, elements that
They align with international best practices for Single Window and trade facilitation.
(BRAZIL, 2024; OECD, sd; WTO, sd).

From the perspective of aviation logistics, these initiatives are particularly relevant because
pointing towards a transition to a more integrated and predictable model, capable of reducing
Eliminate redundancies in documentation and facilitate faster responses in time-sensitive operations.
Nevertheless, the literature and institutional diagnosis suggest that the full consolidation of these
Gains depend on overcoming challenges of integration between agencies and harmonization.
procedural and uniform dissemination of practices throughout the national territory (OECD, n.d.; WTO,
sd).

4. AOG Operations and the Impact of Customs Frameworks

Aircraft on Ground (AOG) operations represent one of the most critical scenarios in
aeronautical logistics, since the unavailability of an aircraft triggers disruptions that
They require an immediate response on multiple fronts, including maintenance, supplies, transportation, and...
Regulatory coordination. The technical literature treats AOG as an event associated with losses.
significant economic factors and a structural problem of availability, strongly related to

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inventory management of parts, supply chain predictability, and information integration.
in real time (ALOMAR; NIKITA, 2025; YADAV; KULKARNI; YAO, 2022).
Studies applied to maintenance and operations management indicate that reducing downtime in
AOG events depend not only on the technical capacity for diagnosis and repair, but also on...
Efficiency of logistics processes that enable timely access to components and materials.
Critical factors. In this context, the speed of parts replacement becomes a determining factor for the
operational performance, reinforcing the idea that unproductive delays, especially at key points
Regulatory interface issues amplify the costs associated with aircraft unavailability.
(ALOMAR; NIKITA, 2025; YADAV; KULKARNI; YAO, 2022).

4.1 Why customs imports in AOG: time, predictability, and document friction

In global aviation supply chains, AOG events frequently require the movement of aircraft.
urgent international need for components, tools, or maintenance materials. In this situation, the
Customs ceases to act solely as a control body and begins to act as a direct conditioner.
of logistical response time. The literature on trade facilitation acknowledges that
Customs procedures characterized by documentary redundancies and low system integration.
Limited predictability increases the risk of delays, especially in time-sensitive flows.
such as those in the aeronautical sector (OECD, n.d.; WTO, n.d.).
Although many studies on AOG emphasize forecasting techniques, inventory optimization, and
Regarding the improvement of internal maintenance processes, there is convergence in the recognition that...
The effective availability of the part depends on its timely release at the border. Thus, even
When the part is physically available and international shipping is fast, regulatory bottlenecks
They can artificially prolong the aircraft's downtime, highlighting the role
central role of customs milestones in logistics performance in critical scenarios (OECD, n.d.).

4.2 Trade facilitation as a driver of time and cost reduction

In the international regulatory framework, the Trade Facilitation Agreement of the World Trade Organization
Trade dictates that formalities and documentary requirements should be reviewed and simplified.
with the aim of reducing the complexity and costs of compliance. In particular, Measure 10.4
TFA recommends the implementation of Single Window systems, allowing the submission of
Data and documents are processed through a single entry point, preventing duplicate requests.

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once the information has already been received and encouraging the use of information technology (WTO, sd).

The relevance of these provisions for AOG operations stems from the fact that reforms aimed at Eliminating redundancies in documentation and increasing interagency coordination are the key factors. directly address points of friction that, in emergency scenarios, tend to become critical bottlenecks. A Literature on trade facilitation highlights that average gains in clearance time, even though While seemingly modest in aggregate terms, they become particularly relevant in operations. characterized by high temporal sensitivity, such as aeronautical operations (OECD, n.d.; WTO, n.d.).

4.3 Empirical evidence of operational gains associated with facilitation

The practical usefulness of facilitation tools is supported by empirical evidence at the level. Macroeconomic studies based on large samples of countries estimate that implementation A realistic approach to the measures outlined in the TFA can significantly reduce the average release time. Customs duties for imports and exports have a direct impact on trade costs. In addition, the OECD points out that more efficient border processes, driven by Reforms associated with the TFA are related to the estimated reduction in trade costs over time. of the last decade (OECD, n.d.; WTO, n.d.).

Although such results are not specific to the aviation sector, their relevance to operations AOG is methodologically justifiable. Firstly, AOG represents an extreme case of Time sensitivity, such that average reductions in release days suggest a margin. concrete measures to mitigate critical delays. Secondly, the core TFA measures — such as Single Window processing, acceptance of copies, and document streamlining—these all directly affect the same issues. points that, in AOG events, tend to generate disproportionate delays (OECD, n.d.).

4.4 Operational benchmarks: digitalization and regulatory turnaround

Among the international examples frequently used as empirical references for single-window models Mature development is highlighted by the case of Singapore. The UNECE case study on the TradeNet system is also noteworthy. describes a digital architecture that connects private operators and multiple authorities. governmental, registering a high annual volume of electronic processing and deadlines of Significantly reduced response rates for most requests. Institutional publications

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They also indicate that the digital integration and institutional design of TradeNet allow for returns.
electronics in a few minutes in almost all cases analyzed (UNECE, n.d.; WCO, n.d.).
Although such indicators do not, in themselves, imply that the release of AOG aircraft parts
If it occurs automatically within that same time interval, the benchmark is technically relevant because
to demonstrate that a regulatory architecture based on single submission, interagency coordination
and electronic processing is capable of drastically reducing regulatory turnaround. This type of
Institutional capacity is precisely what mitigates the risk of artificial delays in logistics chains.
time-sensitive (UNECE, n.d.; WCO, n.d.).

4.5 Reliable operators and risk management in critical loads

In addition to digitalization, international benchmarks show that customs efficiency in flows
Critics also depend on robust risk management models and operator programs.
reliable. The WCO notes that the SAFE Framework of Standards was adopted with the aim of
To reconcile security and facilitation by introducing the paradigm of partnerships between customs and the sector.
private. The institutionalization of the Authorized Economic Operator concept reinforces this logic by
grant procedural benefits to operators with a proven track record of compliance and
adequate internal controls (WCO, n.d.).
Experiences in other jurisdictions, such as the European Union and the United States, demonstrate that
Trusted operator programs are used as tools for prioritization and simplification.
for low-risk cargo, reducing the incidence of physical inspections and speeding up processing.
For AOG operations, this logic is particularly relevant, as it allows for the concentration of control in...
It facilitates higher-risk shipments, while enabling faster release of critical cargo.
associated with highly compliant operators (WCO, n.d.).

4.6 Brazil: impact on AOG, absence of a specific regime, and ongoing modernization.

In the Brazilian case, institutional analysis indicates that, despite the existence of mechanisms for
Facilitation, such as trusted operator programs and digitization initiatives, is not a single regime.
Customs procedures specifically structured for AOG operations. The absence of dedicated treatment,
coupled with institutional fragmentation and the need for interaction with multiple intervening bodies,
It tends to reduce predictability and speed in critical situations, amplifying the logistical impact.
of delays (OECD, sd; WTO, sd).

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At the same time, modernization is underway through the Single Window for Commerce Program.
Externally, it points towards a gradual convergence with international best practices. The emphasis
In digitalization, system integration, and risk management, this suggests the potential for reducing friction.
documentation and improved regulatory response time. However, from the point of view of
AOG operations, literature, and comparative diagnosis indicate that the absence of mechanisms
Explicit procedural prioritization limits the immediate reach of these gains, reinforcing the
need for specific policies compatible with risk-based control (OECD, n.d.; WTO,
sd).

5 Customs compliance and risk-based governance

Customs compliance, especially in critical supply chains such as aviation,
It depends on a three-pronged approach: (i) regulatory predictability; (ii) controls proportionate to the risk; and (iii)
Governance with structured communication between operators and authorities. This three-pronged approach is consistent with...
international literature on customs modernization shifts the focus from broad controls and
undifferentiated models that combine procedural simplification and targeted oversight.
by risk, without abandoning control standards. (WCO, n.d.). [customs.gov.sg]
In global contexts, this rationale appears explicitly in the Kyoto Convention.
Revised Kyoto Convention (RKC), presented by the World Customs Organization as
a “blueprint” for modern and efficient customs procedures. The WCO lists how
The central principles of RKC are transparency and predictability of customs actions, and standardization.
and the simplification of the declaration and supporting documents, the adoption of procedures
simplified for authorized personnel, maximum use of information technology, control
minimum necessary to ensure compliance, the use of risk management and controls based
in auditing, coordinated interventions with other border agencies, and partnerships with trade.
(WCO, n.d.). [customs.gov.sg], [storage.un...etwork.com]

5.1 RKC as a benchmark for modern compliance: predictability, risk and audit

From a legal and institutional point of view, the Preamble to the RKC is particularly useful for providing a foundation.
The "compliance" dimension is important because it makes explicit that simplification and harmonization can be achieved.
through: (a) applying customs procedures in a predictable, consistent and transparent manner;
(b) adoption of modern techniques, such as risk management and audit-based controls; and (c) maximum use

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practicable information technology, combined with cooperation with other authorities.
nationals, other customs administrations and the trading community. (WCO, 2008).
The direct implication for aviation supply chains is that "risk + audit" governance repositions
Compliance as a requirement for organizational capability: companies need to maintain
Document traceability, consistent internal controls, and auditable evidence to support
Simplified and predictable processes. This logic is compatible with the notion of "minimal control."
"necessary" as described by the WCO, which assumes that the intensity of control is calibrated to the risk.
and to operator reliability, rather than operating through indiscriminate inspections. (WCO, n.d.).

5.2 The RKC as a mandatory normative framework: General Annex and implementation

In addition to the statement of principles, the WCO provides technical documentation that reinforces the character of
structuring of the instrument. The Tool Kit for Quality implementation assessment informs that the RKC
It was adopted in 1999, following a review process associated, among other factors, with the evolution of
Information technology and the migration to a risk management-based approach. The document
It also states that the principles of the instrument are reflected in the General Annex and describes its structure.
in chapters and standards, highlighting that, when adhering to the RKC, the body and the General Annex are mandatory.
(WCO, 2013).
For the purposes of this article's argument, this point is relevant because it allows us to support, in terms...
Technical and legal aspects indicate that customs compliance is not merely a matter of punctual formal adherence, but rather adherence...
a procedural model designed to generate predictability and efficiency through standards
common areas — with room for effective risk-based control and auditing. The documentation
WCO's institutional statement reinforces that RKC positions itself as a benchmark in "simple procedures."
and efficient" that reconcile facilitation and control, an axis directly applicable to urgent flows and
Critics, such as those in the aviation sector. (WCO, n.d.; WCO, 2013). [customs.gov.sg], [wcoesarpsg.org]

5.3 Convergence with trusted operator programs: SAFE/AEO and governance by trust

The evolution of compliance towards risk is also consistent with the partnership architecture.
Customs-business described in the WCO supplementary instruments. The WCO notes that SAFE
The framework was adopted in 2005 as a response to "secure and facilitate global trade," and in 2007...
The Authorized Economic Operators (AEO) program was introduced as a partnership program.
between customs and the private sector. (WCO, n.d.). [gov.br], [wcotradetools.org]

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In the context of the present study, the importance of these instruments lies in the fact that they consolidate The "trusted operators" paradigm as a governance mechanism: benefits and simplifications. Procedural aspects are subject to compliance and safety criteria, reinforcing the role of Compliance as a central element for operational predictability. The institutional description of SAFE/AEO provides a basis for connecting RKC (modern procedures) to the contemporary model. of partnership and reliability — particularly relevant for highly critical supply chains and Time-sensitive. (WCO, n.d.).

5.4 Brazil: OAS Streamlines procedural governance and real-time compliance

In Brazil, the governance dimension of compliance is not materialized solely in rules of certification, but also in institutional instruments for post-certification guidance. The Revenue Service The Federal government describes OEA Agiliza as a communication channel made available for clarification. Questions about the AEO Program and related customs procedures, aimed at the points Contact information for certified operators registered in the OEA System. The official page also indicates The channel's institutional email address informs operators that they can send questions. related to the OAS Program and reporting situations that require guidance from the team. responsible. (RFB, 2026).

The same official source lists hypotheses for the use of the channel directly connected to the axis of Compliance: clarifications on certification, monitoring and revalidation; guidance on updating information in the system; communicating relevant situations related to maintaining certification; reporting suspicions/incidents related to supply chain security. supplies or customs compliance; and clarification of doubts about benefits and operationalization of the AEO Program. Furthermore, it recommends that the operator provide identification. and context (company, CNPJ, type/level, objective description, application/process number) and contact information for the person in charge), reinforcing a logic of traceable and auditable communication. (RFB, 2026).

As an institutional reinforcement, the Federal Revenue Service maintains an OAS Communications page that It records, in a timeline, the “OEA-Agiliza Launch” as the exclusive channel for OEAs. formally demonstrating the inclusion of AEOs in the program structure. (RFB, 2026). Furthermore, The institutional document (“The New Era of the OAS”) mentions OAS Agiliza as an exclusive channel. Customer service to quickly answer questions about the AEO Program and related matters. describing it as a direct benefit to certified operators. (RFB, 2026).

The analytical implication of this article is that OEA Agiliza acts as a governance instrument. A procedural approach that reduces information asymmetries and increases predictability by offering a channel.

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Formal and structured guidance for compliant operators. This function is convergent with the
The spirit of the RKC Preamble emphasizes predictability, transparency, and the adoption of techniques.
modern practices and cooperation with the trade community, strengthening the operator's capacity to
to prevent non-conformities and to document due diligence. (WCO, 2008; RFB, 2026).

6 Future perspectives: digitization and regulatory harmonization

The contemporary transformation of customs systems converges towards a model
progressively digital, interoperable and data-driven, in which the “regulatory speed”
It stems less from ad hoc exceptions and more from stable processing architectures.
Standardization and coordination among agencies. This direction is observable in instruments.
multilateral initiatives aimed at facilitating trade, as well as regional and national initiatives.
Customs modernization, which links digitalization to procedural simplification and management of
risk. (WTO, sd; UNECE, 2020; WCO, sd; EUROPEAN COMMISSION, sd; BRASIL, 2024).
Conceptually, interoperability should be understood as the ability of multiple...
authorities and systems share data and decisions in a coordinated and consistent manner, so that
to reduce redundancies and increase predictability for private operators. This concept
It appears both on the international Single Window agenda and in modernization instruments.
customs procedures that emphasize coordination with other border agencies and the maximum use of
Information technology. (UNECE, 2020; WCO, n.d.; WCO, 2013).

6.1 Single Window is the principle of single submission (“once-only submission”).

The WTO Trade Facilitation Agreement establishes, in Measure 10.4, that Members must
to make efforts to implement or maintain a Single Window, allowing operators
submit import, export, or transit documentation and/or data to a single point of contact.
entry to the participating authorities, with timely notification of the results through the same means.
system. (WTO, n.d.).
The text of the agreement also stipulates that, once the documentation and/or data have been received...
through the single window, they should not be requested again by the participating authorities, except
Limited and publicly disclosed exceptions are made, and the use of information technology is recommended for support.
to the system. (WTO, n.d.).
This regulatory framework is central to time-sensitive supply chains — such as the aeronautical industry.
— because it reduces document friction, limits duplicate submissions, and promotes coordination.

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Decision-making between agencies, elements that directly impact the predictability and time of release.
(WTO, n.d.; UNECE, 2020).

6.2 Recommendation 33 (UNECE): Interoperability as administrative reform and informational

UNECE, through Recommendation No. 33 (ECE/TRADE/352/Rev.1), describes that, in many
In different countries, companies need to submit large volumes of information and documents to different authorities.
agencies, often through separate systems and forms, which constitutes a burden.
Relevant to governments and the private sector, as well as a barrier to international trade.
(UNECE, 2020).
In response, Recommendation 33 defines the single window as a federating-capable structure.
relevant administrations, allowing information and/or documents to be submitted only
once at an entry point, with the potential to accelerate and simplify information flows.
between trade and government and promote harmonization and data sharing between
Governmental systems. (UNECE, 2020).
The same guideline emphasizes that the single window is the practical application of facilitation concepts.
trade initiatives aimed at reducing non-tariff barriers and compliance costs, which may increase
Efficiency and effectiveness of official controls and improved resource allocation. (UNECE, 2020).

6.3 Data standardization and common semantics: interoperability beyond digitization

Institutional literature suggests that digitizing procedures is insufficient when there is no...
Data standardization and semantic interoperability between systems. In window experiences.
Uniquely mature, evolution involves alignment with international standards and the integration of multiple
connectivity layers (G2G, B2G and B2B), focusing on reducing document weight and harmonizing
the information. (WCO, 2014).
In the case of Singapore, the WCO document states that TradeNet has undergone updates to
aligning with new standards and promoting consistency and uniformity, mentioning alignment with
The WCO Data Model in its updated version. (WCO, 2014).
From the analytical point of view of this article, this demonstrates that interoperability is not limited
not to “eliminate paper”, but to structure an environment in which data circulates coherently between
involving multiple regulatory and private actors, reducing inconsistencies, reprocessing, and costs.
coordination. (UNECE, 2020; WCO, 2014).

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6.4 Interagency interoperability: coordination of controls and joint interventions

The Revised Kyoto Convention, described by the WCO as a "blueprint" for modern procedures,
It explicitly states, as a principle, the implementation of coordinated interventions with other border agencies.
and the maximum use of information technology, in addition to transparency and predictability, risk management.
and audit-based controls. (WCO, n.d.).
This approach aligns with the logic of "coordinated border management" described in Brazilian initiatives to modernize
the Single Window Portal, which emphasize coordinated physical inspection.
between the Federal Revenue Service and other intervening bodies, carried out concurrently, with
Monitoring of the private sector through the single channel associated with DUIMP. (BRAZIL, 2022).
From an institutional design perspective, this type of coordination reduces associated costs and timelines.
to the availability of goods for inspection, as it avoids duplication of interventions and streamlines the process.
the flow of decisions between the bodies. (BRAZIL, 2022).

6.5 European Union: Institutionalized digitalization and the goal of a paperless customs union

In the European Union, the European Commission describes the Union Customs Code as a central element.
Regarding customs modernization, stating that the UCC seeks a customs union that is "paperless and fully integrated."
"automated," which requires the updating of electronic systems and the introduction of new systems for
the completion of customs formalities. (EUROPEAN COMMISSION, n.d.).
The Commission also reports that the UCC entered into force on May 1, 2016, with arrangements
Transitional issues arising from the fact that not all planned electronic systems were
fully implemented. (EUROPEAN COMMISSION, sd).
These elements reinforce the idea that institutionalized digitization tends to operate as a
a gradual and systemic process, whose effectiveness depends on the coordinated implementation of
data and systems infrastructure, in line with the principles of interoperability and standardization
advocated in international forums. (EUROPEAN COMMISSION, n.d.; UNECE, 2020).

6.6 Brazil: Single Window, DUIMP and interoperability as public policy

In Brazil, the Single Window for Foreign Trade Program is described as an initiative aimed at
to reduce bureaucracy, time and costs in exports and imports, with the aim of
Reformulate processes and create a single point of contact to centralize interaction between the government and the...
Private operators of foreign trade. (BRAZIL, 2024).

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The government communication regarding the migration of imports to the Single Window Portal highlights that the The program is aligned with international best practices and mentions gains such as the reduction of 99% paperless use, joint inspection between government agents, use of a single license for multiple operations, payment of fees via a Single Portal, and interoperability in the exchange of... certificates. (BRAZIL, 2024).

Along the same lines, institutional publications report that the new model allows for physical inspection. coordinated import of goods, with joint definition of inspection through the DUIMP and monitoring of interventions by operators, in a transparent manner, in addition to mentioning centralized payment initiatives within the Single Portal environment. (BRAZIL, 2022).

In analytical terms, these elements indicate convergence with Single's international agenda. Window and with principles of customs modernization guided by technology, risk management and Interagency coordination. However, as the international instruments themselves indicate, the Full effectiveness depends on system integration, data standardization, and cooperation. Continuous institutional support. (WTO, n.d.; UNECE, 2020; WCO, 2013).

6.7 Risk management and auditing as an "engine" of automation and predictability

RKC combines facilitation with effective controls through risk management and control-based approaches. In auditing, in addition to anticipating the maximum use of information technology and minimal control... necessary to ensure compliance. (WCO, n.d.).

The WCO implementation technical documentation reinforces that the review that culminated in the RKC This was related to the evolution of information technology and the migration to the data-based approach. at risk and describes that the principles of the instrument are reflected in the General Annex, emphasizing the mandatory body and General Annex for the Contracting Parties. (WCO, 2013).

In practical terms for the aeronautical sector, this vector suggests that digitalization with Interoperability tends to produce more consistent gains when accompanied by governance. Risk-oriented, as it allows focusing control on operations that require intervention. reducing unnecessary delays in low-risk, high-temporal-criticality flows. (WCO, n.d.; WTO, n.d.).

Conclusion

The comparative analysis developed throughout the article shows that aeronautical logistics International operations are subject to high temporal and regulatory sensitivity, and Aircraft events on

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Ground (AOG) amplifies the operational cost of any unproductive delay, including
associated with formalities and border controls. (ALOMAR; DIALLO, 2025; YADAV;
(KULKARNI; YAO, 2022). In this context, customs frameworks cease to be merely mechanisms.
administrative and begin to function as institutional infrastructure that conditions the
Predictability, lead time, and resilience of maintenance and supply chains.
aeronautical. (OECD, n.d.).

In Section 1, it was demonstrated that the criticality of the AOG stems from the need for a rapid return to service and that logistical efficiency depends on the coordination between technical processes (maintenance, supplies and transportation) and regulatory processes (clearance and controls). (ALOMAR; DIALLO, 2025; YADAV; KULKARNI; YAO, 2022). The same section argued that the international agenda Trade facilitation aims to streamline technical and legal procedures at the border, with a view to to reduce friction and compliance costs, which is particularly relevant in sensitive supply chains. over time. (OECD, n.d.).

In Section 2, the historical-evolutionary perspective consolidated the convergence between the governance of Air transport and customs modernization in the post-war period, highlighting the centrality of Annex 9 – Facilitation as a sectoral tool aimed at reducing delays, standardizing documentation, and... Simplification of procedures, with emphasis on coordination between authorities such as customs, Immigration and public health (ICAO, 2017). In parallel, the RKC was identified as a reference. regulations for "modern customs," by listing principles of transparency and predictability, Document simplification, maximum use of technology, minimum necessary control, risk management and Audit-based controls, in addition to coordinated interventions with other border agencies. and in partnership with commerce. (WCO, n.d.; WCO, 2013).

In Section 3, it was found that the Brazilian system combines procedural layers and a diversity of regimes and instruments, which tends to increase the need for specialization, the cost of Compliance and the risk of friction in urgent operations (OECD, n.d.). At the same time, the ongoing institutional modernization through the Single Window for Foreign Trade was presented. as a strategy to reduce bureaucracy, time and costs, and to create a "one-stop shop" to centralize the interaction between the government and private operators, moving closer to the logic of Single Window. (BRAZIL, 2022; BRAZIL, 2024). The progressive migration to DUIMP, within the context of the Single Window Portal, reinforces the transition to integrated digital processes and mechanisms. more structured coordination, inspection and monitoring. (BRAZIL, 2022; BRAZIL, 2024).

In Section 5, the AOG was characterized as a "stress test" of boundary systems, because the The urgency makes the effects of redundancies in documentation, poor integration, and other issues more visible. uncoordinated decisions. (ALOMAR; DIALLO, 2025; OECD, n.d.). The discussion demonstrated that the

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A facilitation agenda, when guided by digitalization and risk management, is associated with
Systemic efficiency gains: the OECD describes facilitation as measures that simplify and
They streamline technical and legal procedures at the border and state that more border processes
Efficient measures, driven by the implementation of TFA, are associated with an estimated reduction in
Trade costs have increased by up to 5% in the last decade. (OECD, n.d.).
Section 6 explored compliance as a cornerstone of modern governance, arguing that RKC
It combines facilitation and control through predictability, transparency, risk management, and auditing.
posterior and information technology. (WCO, n.d.; WCO, 2013). This logic is directly related
with reliable operator programs and institutional structures that seek to improve
guidance and predictability for compliant operators, as exemplified by OEA Agiliza,
Institutional channel for communication and clarification within the scope of the OAS Program. (RFB, 2026).
In Section 7, it was established that the future of customs governance is digital and interoperable, with the
Single Window and the once-only submission principle as the functional core for reduction.
of redundancies and regulatory coordination. (WTO, n.d.; UNECE, 2020). The text of Measure 10.4
The TFA (Technical Assessment Form) explicitly states the single-point submission, the timely notification of results, and the prohibition of...
Re-requesting data already received (except for publicly disclosed exceptions) and encouraging the use of IT.
establishing an international normative standard for administrative interoperability. (WTO, n.d.).
Recommendation 33, in turn, describes the single window as a response to the burden of submissions.
multiple agencies and recognizes gains from harmonization and data sharing.
between governmental systems. (UNECE, 2020).
International comparisons have also shown that institutionalized digitization can take over.
Distinct formats, but tending to converge towards similar goals, such as "paperless and fully digital."
"Automated customs." In the European Union, the European Commission describes the Union Customs Code as follows:
It aims for a paperless and fully automated customs union, based on electronic systems for
customs formalities. (EUROPEAN COMMISSION, n.d.). In Singapore, TradeNet is
Presented as a single national window, with electronic response to permissions in a few
minutes in almost all cases, serving as an empirical reference for capacity to
Regulatory response in an integrated digital environment. (UNECE, n.d.; WCO, 2014).
In light of this body of evidence, it is concluded that aeronautical logistics competitiveness —
especially in AOG scenarios — tends to be higher in environments that combine: (i)
(i) interoperability via Single Window; (ii) standardization and data sharing for
interagency coordination; and (iii) risk-based compliance governance and auditing, with the use of
Maximum technology. (WTO, n.d.; UNECE, 2020; WCO, n.d.; WCO, 2013). Brazil is advancing by structuring the
Single Window Portal as a one-stop shop and by introducing mechanisms such as coordinated inspection.

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and interoperability in the exchange of certificates, but the maximum gain is in predictability and responsiveness.
Rapid implementation depends on consolidating interagency integration and the operational maturity of the systems.
and practices on a national scale. (BRAZIL, 2022; BRAZIL, 2024; OECD, n.d.).

Finally, from an academic point of view, the study contributes by integrating sectoral frameworks (ICAO) and frameworks
customs (WCO/WTO/UNECE) under the same interpretative axis: logistical efficiency in
Critical supply chains depend on a predictable, digital, and risk-driven regulatory architecture.
(ICAO, 2017; WCO, n.d.; WTO, n.d.; UNECE, 2020). From an applied perspective, the results
They suggest that public policies aimed at the aeronautical sector should prioritize interoperability.
Risk-based coordination and controls as mechanisms for mitigating delays in flows.
urgent needs, rather than relying exclusively on exceptional and ad hoc solutions. (WCO, n.d.; OECD,
sd).

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Notes

1. *The Federal Revenue Service organizes a subportal with multiple regimes and manuals (e.g., Admission). Temporary, Drawback, Recof), highlighting the multiplicity of instruments and pathways. procedural aspects in foreign trade.*
2. *The Siscomex Registration Manual describes the purpose of guiding stakeholders and References the normative disciplines (IN RFB No. 1,984/2020 and Coana Ordinance No. 72/2020).*
3. *The Temporary Admission Manual is for guidance purposes only and makes explicit reference to IN. RFB No. 1,600/2015, structuring the regime by purpose (total suspension, use economic and active improvement).*
4. *The Federal Revenue Service defines drawback as a regime established by Decree-Law No. 37/1966, which suspends or eliminates taxes levied on imported inputs intended for the product. exported, and describes the modalities (exemption, suspension and restitution).*
5. *RFB Instruction No. 2,126/2022 provides for Recof and describes that the regime allows for... Import/acquisition with tax suspension, under computerized customs control, for industrialization destined for export or the domestic market, including the modality Recof Sped.*
6. *RFB Instruction No. 2,225/2024 (compilation) mentions requirements and scenarios for companies that exclusively perform maintenance or repair of aircraft or equipment for use. aeronautical in the context of the Recof regime.*
7. *The Single Window for Foreign Trade Program (Siscomex Portal) informs that it has as The goal is to reduce bureaucracy, time, and costs, and it began in 2014 with the creation of a A single point of contact to centralize interaction between the State and private operators.*
8. *Government statement on import migration to the Single Portal describes Benefits and characteristics: intensive use of technology and risk management, 99% reduction in... Use of paper, joint inspection, and interoperability.*
9. *The Federal Revenue Service describes the DUIMP (Single Import Declaration) on the Single Portal, indicating that it is completed there and Introducing the features of the import module.*
10. *Studies on AOG and process optimization emphasize that the unavailability of Aircraft is associated with losses and disruptions and strategies are discussed (e.g., forecast, (data integration, process improvement) to reduce downtime.*
11. *The TFA provides for the review and simplification of formalities and documents and establishes the Measure 10.4 (Single Window), with submission through a single point and preventing duplication of Requests for data already received (except in exceptional cases).*

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12. *UNCTAD's technical note on art. 10.4 describes the Single Window as a reform.*
fundamental, capable of streamlining and simplifying procedures, reducing the burden of compliance.
as well as the time and cost of release.
13. *Academic evidence suggests that the realistic implementation of TFA measures could*
reduce customs clearance time (3.7 days for imports; 1.9 days for exports), with
based on OECD/TFA indicators.
14. *The OECD notes that trade costs are estimated to have fallen "by up to 5%" in the last*
decade, due to more efficient border processes associated with the implementation of the TFA.
15. *The UNECE case study on TradeNet documents operational metrics (volume*
(annual and response time), and the WCO publication reports that the response time is up to 10 minutes.
in 99% of cases.
16. *The WCO records the adoption of the SAFE Framework (2005) and the introduction of AEO (2007) as*
A partnership between customs and the private sector.
17. *CBP describes C-TPAT Trade Compliance as a voluntary program with benefits;*
The GAO report describes these benefits as fewer inspections and less processing.
accelerated, in exchange for additional security requirements.
18. *The text of the source article indicates that, in Brazil, despite the Blue Line, there is no specific AOG regime,*
which limits rapid response; at the same time, the Single Portal indicates
Modernization and a single service window.
19. *The WCO lists the principles of RKC (transparency, predictability, document simplification,*
IT, risk and audit, interagency coordination and partnership with trade.
20. *The RKC Preamble explicitly states the application of "predictable, consistent and transparent" principles and the*
adoption of "risk management and audit-based controls" and "maximum practicable use of
"information technology" as principles for simplification/harmonization.
21. *The WCO Implementation Toolkit mentions that RKC was adopted in 1999, and that the*
The principles are set out in the General Annex and describe the structure of the General Annex (10 chapters, 108
standards and 13 transitional standards), in addition to affirming the mandatory nature of the body and of
General Annex for the Contracting Parties.
22. *The Federal Revenue Service describes OEA Agiliza as a communication channel for points of*
Contact information for certified operators, a list of typical uses, and recommendations for minimum information for
to facilitate service.
23. *The "OAS Communications" page records the launch of OAS Agiliza as an exclusive channel.*
from the OAS, and the institutional PDF describes the objective of rapid response and the channel.
direct/priority to the contact points

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24. *The TFA (Measure 10.4) establishes the* Single Window model *with submission via a single point, prohibition of duplicate requests for data already received (except in exceptional cases) and Encouraging the use of IT.*
25. *The UNECE (Recommendation 33) defines* Single Window *as a single submission in a single window. Entry point for meeting regulatory requirements, reducing costs and barriers. procedural.*
26. *WCO publication on Singapore mentions alignment with standards (including WCO standards). (Data Model) and relates data standardization to harmonization and interoperability in single window systems.*
27. *The WCO lists, as a principle of the RKC, the coordination of interventions with other agencies. across the border, connecting modernization to interagency interoperability.*
28. *Government communication regarding the Single Window Portal: joint inspection list and Interoperability in the exchange of certificates, in addition to paper reduction, technological base and risk management.*
29. *The European Commission describes the UCC as a modernisation instrument, aimed at A "paperless and fully automated" customs union, dependent on electronic systems for customs formalities.*
30. *The Single Window Program page describes the objectives of creating a single point of contact and reducing bureaucracy, time, and costs; the RFB describes the DUIMP on the Single Window Portal and its... functionalities.*
31. *The RKC Preamble explicitly states predictability and transparency, risk management, and Auditing and maximizing the use of IT as principles for simplification and harmonization, without compromise the controls.*
32. *The WCO toolkit on RKC implementation describes evolution-driven review. from IT and the migration to a risk-based approach, reinforcing IT+risk/audit as foundation of modernization*

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