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RCMOS – Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.

Year VII, v.1 2026 | Submission: 03/14/2026 | Accepted: 03/17/2026 | Publication: 03/20/2026

Prevention of customs risks and the structuring of multimodal networks in foreign trade from the perspective of transaction costs.

Customs risk prevention and the structuring of multimodal networks in foreign trade from the perspective of transaction costs

Prevention of customs risks and the structure of multimodal networks in foreign trade from the perspective of transaction costs

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Summary:

The intensification of non-tariff barriers and the regulatory complexity of contemporary international trade point to customs clearance as one of the main global logistical bottlenecks. The literature suggests that documentary errors and incorrect tariff classification increase transaction costs and tend to disrupt the flow of multimodal networks.

This article analyzes the strategic role of freight forwarders and intermediaries in controlling customs risks, through the theoretical lenses of Transaction Cost Economics and Agency Theory. Based on a critical review of studies published between 2021 and 2024, it discusses the impact of digitalization on smart ports and the inherent limitations of autonomous technologies in the face of ambiguous legislation. It observes that, despite the advancement of distributed systems, such as Blockchain, the tacit knowledge of specialized human capital remains a central factor for maintaining resilience in cross-border operations.

Keywords: Risk Prevention, Agency Theory, Multimodal Networks, Transaction Cost Economics, Freight Forwarding.

Abstract:

The intensification of non-tariff barriers and the regulatory complexity of contemporary international trade point to customs clearance as one of the main global logistical bottlenecks.

Literature suggests that documentary failures and incorrect tariff classification increase transaction costs and tend to interrupt the flow of multimodal networks. This article analyzes the strategic role of intermediaries and freight forwarders in controlling customs risks, adopting the theoretical lenses of Transaction Cost Economics and Agency Theory. Based on a critical review of studies published between 2021 and 2024, the impact of digitalization in smart ports and the inherent limitations of autonomous technologies facing ambiguous legislation are discussed. It is observed that, despite advances in distributed systems such as Blockchain, the tacit knowledge of specialized human capital remains central to maintaining resilience in cross-border operations.

Keywords: Risk Prevention, Agency Theory, Multimodal Networks, Transaction Cost Economics, Freight Forwarding.

Introduction

In the context of global logistics operations, international trade operates within an ecosystem.

characterized by extensive fragmentation of production chains and substantial increase

of cross-border regulations. Although the historic reduction in import tariffs has

Given the ease with which commercial globalization has been facilitated in recent decades, recent literature observes a

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A tightening of national protection measures and the proliferation of non-tariff barriers. In this adverse context, the customs interface ceased to be seen as a mere procedure. bureaucratic governmental control to be understood as one of the most important nodes susceptible to disruptions in supply chain management, which demands management highly structured compliance.

Studies in operations management have devoted increasing attention to how frictions Customs duties affect the fluidity of multimodal transport networks. Evidence indicates that... time goods are held in customs areas, often resulting from Documentary inconsistencies have a direct and detrimental impact on the working capital of... organizations and the level of service offered to the end consumer. Given the practical difficulty To manage such internal legislative volatility, shipping companies tend to to delegate the monitoring of its international flows to specialized intermediaries, which It alters the traditional scope of freight forwarding operations.

This article aims to critically analyze the mechanisms for containing Customs risks and their relevance in structuring international transport networks. For Therefore, the theoretical development is based on five fundamental sections that examine the Regulatory complexity through the lens of transaction costs: the role of the intermediary. Logistics in light of Agency Theory, the propagation of failures generated by border bottlenecks, the impacts and limitations of digital innovations in customs and, finally, the centrality of Human capacity building in resolving regulatory ambiguities.

1. Regulatory Complexity and Transaction Costs in Global Trade

The formulation of foreign trade policies is highly volatile, which imposes on... Companies need continuous monitoring of legal requirements. While Christopher (2021) highlights the importance of agile supply chains to overcome market instabilities, Handfield et al. (2022) observe that the transition to models Focus on national security resulted in strict source controls and enforcement. Frequent trade sanctions. This theoretical dichotomy is reflected in logistics planning. daily, in which regulatory norms can be changed in an untimely manner.

From the perspective of Transaction Cost Economics (TCE), customs compliance It represents a financial and time expenditure that, essentially, does not add value. perceptible to the product. MacCarthy et al. (2022) argue that the meticulous preparation of

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advance safety declarations, commercial invoices and health licenses increase
significantly increase coordination costs. In scenarios where information asymmetry
The agreement between the customs authority and the importer is pronounced, and the transactional expense tends to...
to grow proportionally to the probability of a tax audit.
The tariff classification of goods, guided by the Harmonized System (HS Code),
This constitutes one of the main sources of uncertainty in cross-border trade. The literature
It points out that the international taxonomy of products often advances at a slower pace.
rather than technological innovation in industry, generating profound areas of ambiguity.
interpretative. Ketchen and Craighead (2021) indicate that inconsistencies in the determination of
tariff codes are associated with retroactive tax liabilities and prolonged audits, which
They tend to paralyze the flow of logistics for indefinite periods.
The financial impacts resulting from non-compliance are acutely felt in
Cargo handling terminals. Goods held for physical inspection or review.
Due to the lack of original documentation, they accumulate costly container demurrage charges and fees.
of extraordinary storage. Studies in the area of logistics costs suggest that these
Ancillary expenses, when underestimated during the planning phase, have the potential to...
to make the operational profit margins of medium-sized imports and exports unviable.
Based on the literature, it can be summarized that customs bureaucracy is consolidating itself as an element
central to the economic viability matrix of foreign trade. The verification that
Customs penalties act as silent liabilities, corroborating the thesis that...
Corporations must internalize regulatory prevention not as an afterthought, but
as a strategic engineering pillar preceding the physical design of its routes to
transport.

2. Freight Forwarding and Agency Theory

Given the dense regulatory web described, producing organizations typically transfer
managing customs compliance for specialized intermediaries, such as freight forwarders and
multimodal transport operators. Fawcett and Waller (2024) document an evolution
A notable theoretical contribution to the conception of this role. Intermediaries have transformed from simple...
Freight brokers in compliance solutions architects. The current agent is
responsible for orchestrating various modal providers under a single scope of service delivery.
services.

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The outsourcing of these responsibilities is frequently analyzed in the literature in light of
precepts of Agency Theory. In this conceptual model, the shipper acts in the capacity of
The principal and the agent act as an agent, receiving the delegation to represent the interests.
of the client before customs authorities and port operators. Carter et al. (2021)
However, they emphasize the natural occurrence of agency risk. If the contractual incentives do not
If they are not properly aligned, the agent may incur documentary negligence, the
Financial penalties will inevitably fall on the nominal importer.
To properly control this agency risk, the adoption of structures is strongly recommended.
Governance models based on the transparent sharing of information. Research indicates
that organizations formalize rigorous Service Level Agreements, which include
indicators such as the document accuracy rate on the first copy and the processing time index
resourcefulness, they tend to bring the intermediary's behavior closer to the interests of
outsourcing, therefore, does not replace the need for auditing and governance.
strict contractual requirements.
In structuring logistics networks, the intermediary plays a role in designing alternatives.
Multimodal approaches to overcome unforeseen bottlenecks. Differing from approaches focused on...
In the context of optimizing specific costs, Ivanov and Dolgui (2022) argue that the domain
deep short-distance road transport connections and interconnections
Railways allows the agent to develop robust contingency plans. The ability
to quickly redesign routes to avoid a port subject to inspection restrictions.
This is emerging as a core competency in the literature on logistics resilience.
It is therefore understood that delegating customs procedures does not constitute an exemption from obligations.
The evidence is not about the importer's legal rights, but rather a strategy for transferring tactical execution.
They point out that the highest degree of protection is achieved by corporations that employ their own agents.
Logistics and customs brokers in the early stages of the development life cycle.
of new products, acting preventively against import barriers before the
original shipment.

3. The Cascade Effect of Borders in the Multimodal Network

In the field of global material flow management, it is noted that interruptions restricted to specific points...
Specific border control systems exhibit a latent capacity to propagate failures.
successive throughout the supply network. Song et al. (2023) employ the terminology

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relevant to the cascading effect to model how a simple delay in customs clearance of
An electronic component malfunction can lead to the complete shutdown of a manufacturing plant.
located at long distances. This phenomenon differs conceptually from the usual distortions of
demand, since it primarily deals with the dispersion of supply disruptions and
Ongoing failures in transportation.

The rigidity of operational architectures focused on high efficiency tends to exacerbate the
Corporate susceptibility to the cascading effect. When medium-sized companies design the
their supply chains based exclusively on tariff minimization, it is common that
concentrate their input flows in a single large port. The literature
This demonstrates that such concentration increases systemic risk. If local customs enforcement...
Even with the establishment of stricter inspection criteria, the inventory flow is hindered, making it unfeasible.
immediate drainage.

With the aim of absorbing these institutional shocks, the development of structures of
Truly multimodal transport emerges as a widely used mitigation guideline.
recommended. MacCarthy et al. (2022) postulate that maintaining directional flexibility,
for example, the ability to convert sea freight to air freight in an emergency or...
Utilizing secondary dry ports functions as a strategic reserve of capacity.
Planned redundancy imposes higher costs under normal conditions, but tends to preserve the
Continuity of factory operations during acute crisis events.

However, implementing this multimodal flexibility is complex and raises new variables.
Bureaucratic synchronization. Each change in logistics mode requires the formulation of new
Transit customs documents. The systemic difficulty of processing this information.
Integrated in an agile manner can, in practice, neutralize the intended time advantage of
Change of the original route. The synchronization between the issuance of the electronic cargo manifest and the
Physical clearance in the courtyard is repeatedly cited as a critical point of friction.

Therefore, the structuring of an international logistics network must necessarily
Incorporate modeling of latency times generated by border bureaucracies. Studies
They indicate that supply forecasting algorithms should consider time indices.
Average customs retention period as a stochastic calculation factor, equating its importance.
to the physical navigation time of merchant vessels for a realistic delineation of
safety stocks.

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4. The Digitization of Customs Clearance and Its Limits

In response to the rising transaction costs at borders, an effort is being observed.
Governmental and private sectors for the digitization of bureaucratic interfaces. Implementation
The progressive deployment of unified platform systems across various territories illustrates the attempt to
eliminate informational redundancies, allowing agents to submit regulatory data.
to a centralized platform accessible to all participating agencies (Treiblmaier,
2021). The model is based on the hypothesis that data unification increases the
Predictability of the customs clearance cycle.
Blockchain technology also figures prominently in recent discussions about
Trust and security in cross-border trade. In their studies, Carter et al. (2021)
They assess how the use of distributed ledgers facilitates the circulation of knowledge.
Electronic Shipping can ensure uninterrupted data integrity. The argument
The central assumption is that the use of encrypted architectures would facilitate auditing processes.
customs clearance would lead to increased clearance rates via the green parameterization channel.
Simultaneously, the literature reports the emerging effectiveness of applying Artificial Intelligence.
in the preliminary scrutiny of documents. Analytical tools trained by algorithms of
Machine learning has the ability to scan commercial invoices in search of
inconsistencies in Common Nomenclature, weight, and value before submission to the portals
customs officials (Ketchen & Craighead, 2021). These innovations have the potential to work.
as advanced preventative measures against sanctions and fines for filling out errors.
Despite these innovations, the academic consensus maintains a cautious stance regarding...
Systemic barriers to global interoperability. Fawcett and Waller (2024) contrast the
Optimism regarding full automation stems from the fact that international trade encompasses economies with...
Deep disparities in digital infrastructure. The creation of smart contracts.
Highly sophisticated practices in exporting countries may not have the desired effect if...
Customs authorities in the destination country may still require this due to local legal frameworks.
A physical document, authenticated by a consulate and signed manually.

In summary, it is clear that digital technology plays a decisive role in optimizing the flow of
Standardized information reduces human errors resulting from fatigue and speeds up processes.
Logical analyses. However, it does not revoke the coercive and analytical core of authority.
state customs. Recent studies indicate that cyber platforms streamline
proper procedures, but intrusive audits to investigate under-invoicing or

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Fraud detection by origin cannot be fully automated, which limits the design of a...
Completely unrestricted and autonomous freedom of movement.

5. Tactical Capacity Building and the Management of Regulatory Exceptions

Defining the boundaries of artificial intelligence and systems automation.
It shifts the academic emphasis to the human factor. Although automation has
demonstrated substantial results in optimizing large-scale standardized transactions.
By volume, research indicates its inherent limitation in resolving legal ambiguities and...
Highly complex customs exceptions (Handfield et al., 2022). In scenarios of
Conflicting tax interpretations regarding the technical characteristics of new equipment.
Imported, the rigidity of the algorithm does not supplant human discernment.
The tacit knowledge accumulated by customs brokers, specialists in operations.
Logistics and compliance agents are considered an irreplaceable core competency.
MacCarthy et al. (2022) argue that the empirical and relational familiarity of agents of
cargo with the precedents of local customs, secondary regulations and the rites of
Specific inspections give agents the ability to prevent and respond quickly.
regulatory impasses that standardized systems are still unable to emulate.
mathematically.

In light of this evidence, executive training and ongoing team development are crucial.
Foreign trade emerges as a strategic priority. The training of analysts should not
if limited to the operational handling of dispatch software, further study is needed.
of comparative tax legislation, of the customs valuation rules of the World Customs Organization.
of trade and international trade facilitation agreements. Evidence suggests that
Teams with a high level of regulatory literacy resolve cargo release issues.
with greater speed and less legal hassle.
The concept of integration based on human supervision gains importance in the management of
Logistics technologies focused on compliance. Instead of seeking complete replacement of
Analysts using Artificial Intelligence systems, the most successful organizations operate in
a model in which the machine performs massive data sorting and flags anomalies.
informational, with the final decision on risk resting with the human expert (Song et al.,
2023). This synergy increases productivity while protecting the company against
Misinterpretations of the machine.

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Consequently, it is observed that investment in education and development of
Careers in logistics and foreign trade have economic justification.
based on Agency Theory and Transaction Costs. Maintaining an internal team or
A highly trained outsourced company acts as an insurance policy against costly fines.
Taxes and devastating operational fees at ports. Intellectual capital, in this context.
Specifically, it stands as the last and most effective line of defense against cross-border risk.

Conclusion

This research conducted a critical analysis of the theoretical and operational mechanisms intended
to the prevention of customs risks and their structural interdependence with the orchestration of
Multimodal transport networks. Based on the theoretical foundation anchored in the Economics of
Transaction Costs and Agency Theory showed that the customs clearance stage...
It surpassed the old model of a mere procedural step and became the central focus of
vulnerability, capable of generating significant disruptions in the globalized environment of supply chains.
contemporary supplies.
An examination of recent literature highlighted that the situation in international trade has been...
distanced from approaches focused solely on agility, facing a growing
unpredictability driven by geopolitical instabilities and frequent revisions of
non-tariff regulations. In accordance with the studies analyzed, it was noted that
operational inefficiencies resulting from incorrect classification in the Harmonized System and
Failures in security declarations lead to high transaction costs. Such phenomena
suggest that manual or retrospective methods of document verification prove to be
outdated in the face of the informational accuracy demands of the modern market.
With regard to the management and intermediation of this flow, the analysis of the strategic role assigned...
The literature attested to the significant model transition experienced by logistics agents and intermediaries.
It supports the view that this professional has developed broad skills, acting in a way...
Consultative and proactive. The real-time formulation of multimodal transport alternatives.
that bypass terminals prone to congestion exemplifies how the intermediary
It adds value by containing the successive propagation of disruptions in the shipper's network.
Although there is a clear trend towards the adoption of unified platforms and technologies
Based on decentralized systems, the review indicated that the expectations of a
Full digitalization runs up against regulatory asymmetries at a global level. The tools

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They demonstrate effectiveness in treating and anticipating informational and flow anomalies.
cohesive documents. Nevertheless, the limits of automation become evident in the face of sovereignty.
customs and the need for value or origin inspections, which remain largely unchanged.
some parts, unrelated to the direct influence of the algorithmic system.
In terms of theoretical contribution, the article establishes a structural connection between the theory
of transaction costs and the dynamics of resilience and fluidity operating in networks
Multimodal transport at risk due to customs issues. Identifying that bureaucratic ambiguity translates into...
In the face of immediate informational friction, the review contributes to operations management by suggesting that the
Mathematical and stochastic modeling of logistics routes actively incorporates the indices of
Customs delays as independent variables in their predictive equations.
From a practical and managerial standpoint, the study warns business decision-makers,
particularly those focused on medium-sized operations, regarding the risks associated with
Outsourcing of legal proceedings without metrics for measurement. The formulation of agreements is suggested.
more robust Service Level agreements with freight forwarders and encouragement for improvement.
of the processes for advance verification of document compliance. It is understood that the
Safer strategies are those in which regulatory auditing anticipates the event by a significant margin.
triggering event for international transport.
It is important to acknowledge that the conclusions presented here have limitations inherent to the scope of the study.
Literature review. The development of models based primarily on environments.
Strong institutional maturity can limit the unrestricted extrapolation of the premises of
digital integration into geographic regions where data infrastructure governance is still lacking.
It is in its early stages. The differences in intervention policies between large [groups]
Consumer markets and emerging economic blocs continue to hinder the adoption of
a universal model of logistics predictability.
To foster future research, the academic agenda should focus on research.
longitudinal empirical studies that assess the direct impact of regulatory literacy on reduction
A systematic review of ancillary expenses paid by importing organizations. Furthermore, the investigation...
Systematic review of the reliability of customs operators' recommendations.
guided by Generative Artificial Intelligence during tax classification episodes of
New products emerge as a valuable horizon for the advancement of decision-making theory.
Machine-assisted decision-making in global trade.

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