LOGISTICAL STANDARDIZATION AND STRATEGIC INTEGRATION: BRAZIL IN THE NATO CODIFICATION SYSTEM

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This article aims to analyze how logistical standardization through the NATO Codification System (NCS) contributes to Brazil's strategic insertion into international defense networks without entailing formal commitments to collective defense. The research adopts a case study approach, based on Yin (2009), combining documentary analysis of official and bibliographic sources with surveys administered to civilian and military subject-matter experts (SMEs) from North Atlantic Treaty Organization (NATO) member and partner countries. The results indicate that the the adoption of the NCS strengthens Brazil's logistical interoperability and the defense technological and industrial base (DTIB) and expands access to markets regulated by Western standards, and enhances regional industrial integration, while also imposing limits on geopolitical repositioning vis-à-vis competing powers. It concludes that technical logistical cooperation serves as a pragmatic tool for modernization and international certification, preserving Brazil's strategic autonomy and producing long-term impacts on both industry and regional security governance.

Keywords: NATO; defense logistics; interoperability; defense technological and industrial base (DTIB); international cooperation.

PADRONIZAÇÃO LOGÍSTICA E INSERÇÃO ESTRATÉGICA: O BRASIL NO SISTEMA DE CODIFICAÇÃO DA OTAN

O objetivo deste artigo é analisar como a padronização logística, por meio do Sistema de Codificação da Otan (NATO Codification System – NCS), contribui para a inserção estratégica do Brasil em redes internacionais de defesa, sem implicar compromissos formais de defesa coletiva. A pesquisa adota um estudo de caso, fundamentado em Yin (2009), combinando análise documental de fontes oficiais e bibliográficas com inquéritos aplicados a especialistas civis e militares (SMEs) de países-membros e parceiros da Organização do Tratado do Atlântico Norte (Otan). Os resultados indicam que a interoperabilidade logística decorrente da adoção do NCS fortalece a base tecnológica e industrial de defesa (BTID) brasileira, amplia o acesso a mercados regulados por padrões ocidentais e potencializa a integração industrial regional, embora imponha limites ao reposicionamento geopolítico frente a potências concorrentes. Conclui-se que a cooperação técnica logística configura-se como instrumento pragmático de modernização e certificação internacional, preservando a autonomia estratégica do Brasil e oferecendo impactos duradouros para a indústria e a governança regional de segurança.

Palavras-chave: Otan; logística de defesa; interoperabilidade; base tecnológica e industrial de defesa (BTID); cooperação internacional.

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ESTANDARIZACIÓN LOGÍSTICA E INSERCIÓN ESTRATÉGICA: BRASIL EN EL SISTEMA DE CODIFICACIÓN DE LA OTAN

El objetivo de este artículo es analizar cómo la estandarización logística, a través del Sistema de Codificación de la OTAN (NATO Codification System, NCS), contribuye a la inserción estratégica de Brasil en las redes internacionales de defensa, sin implicar compromisos formales de defensa colectiva. La investigación adopta un estudio de caso, basado en Yin (2009), que combina el análisis documental de fuentes oficiales y bibliográficas con encuestas aplicadas a expertos civiles y militares (SME) de países miembros y socios de la OTAN. Los resultados indican que la interoperabilidad logística derivada de la adopción del NCS fortalece la Base Tecnológica e Industrial de Defensa (BTID) brasileña, amplía el acceso a mercados regulados por estándares occidentales y potencia la integración industrial regional, aunque impone límites al reposicionamiento geopolítico frente a potencias competidoras. Se concluye que la cooperación técnica logística se configura como un instrumento pragmático de modernización y certificación internacional, preservando la autonomía estratégica de Brasil y ofreciendo impactos duraderos para la industria y la gobernanza regional de la seguridad.

Palabras clave: OTAN; logística de defensa; interoperabilidad; base tecnológica e industrial de defensa (BTID); cooperación internacional.

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1 INTRODUCTION

In recent years, North Atlantic Treaty Organization (NATO) has expanded its collaboration with third countries, including both partners and non-partners. Nevertheless, little attention has been devoted to the impact of defense logistics on the transformations and adaptations of the international system (Yoho, Rietjens and Tatham, 2013). NATO's 2022 Strategic Concept presented partnerships as essential to improving the Alliance's resilience in the context of the security crisis on the European continent caused by the war in Ukraine. NATO is not only a collective defense pact but also a political-military structure that integrates mechanisms for technical cooperation, standardization, and political dialogue (Webber and Hyde-Price, 2015).

Up to 2022, two main approaches to third-state participation had been implemented: one directed exclusively toward countries in the Partnership for Peace (PfP), and another that includes non-Alliance partners in technical programs. Among the latter – requiring individual application and contracting – are programs aimed at managing the life cycle of defense products and the NATO Codification System (NCS), created to standardize the norms of the acquisition system and the defense technological and industrial base (DTIB). The NCS is governed by technical standards established in the Standardization Agreement – STANAG 3150, which defines the uniform system for classifying supplies for

all participating countries (NATO, 2019). This standardization is essential for interoperability among allies and partners, ensuring logistical efficiency, maintenance, and modernization of equipment within an integrated defense ecosystem. Moreover, this process also influences the adoption of similar models by non-members of the NATO Catalog.

The expansion of these collaborations is not restricted to the European sphere. NATO has sought to deepen partnerships with Indo-Pacific countries such as Australia, Japan, South Korea, and New Zealand, aiming to align standards and strengthen military supply chains in a geopolitical context marked by growing strategic competition with China. This movement underscores the importance of structures such as the NATO Support and Procurement Agency (NSPA), which centralizes the management of logistics services and procurement, enhancing the Alliance's responsiveness and reducing vulnerabilities related to dependence on external suppliers for critical defense components. NATO's activities in technical programs, such as defense product life cycle management, are formally structured by the CNAD Life Cycle Management Group (LCMG), which defines responsibilities and processes for the integration of partners and members (NATO, 2003).

Furthermore, NATO's logistical resilience is linked to the development of emerging technologies that enhance supply chains. The use of artificial intelligence for process optimization, blockchain for parts traceability, and additive manufacturing for rapid replacement of essential components are among the innovations that can significantly transform how member states and partners manage their defense infrastructures, increasing operational flexibility and reducing bottlenecks in maintenance and sustainability.

Despite advances in expanding the logistics network and strengthening defense supply chains, the inclusion of external partners in NATO's technical and regulatory processes still faces significant challenges. Regulatory divergences, restrictions on the export of sensitive technology, and political pressures from actors inside and outside the Alliance hinder this collaboration. Deepening such cooperation will depend on NATO's ability to balance collective security interests with the strategic requirements of each member and partner state, ensuring that defense logistics chains operate resiliently in the face of transformations in the international system.

Within NATO's Organizational Framework for Logistics, the Defense Planning Committee is responsible for logistics planning and holds the same level of authority as the NATO Council (NATO, 2007, p. 16). The Alliance's logistics programs encompass initiatives that explore the doctrinal and operational foundations necessary to ensure the readiness of forces associated with NATO.

Standardization of systems and the creation of norms are central elements of the Alliance's structure (Beckley, 2006).

Interoperability is the primary factor in ensuring the operational readiness of forces and is decisive in the Alliance's transition from its political to its military form (Ashcroft, 1970; Beckley, 2006). It is characterized by the ability to achieve objectives within the chain of command without hesitation and without loss of efficiency, especially since national forces are the Alliance's most important asset (Beer, 1969; Komer, 1977). Concern with interoperability and logistical standardization is not new. Since the 1960s, official statements – such as that of the German Secretary of State for Foreign Affairs, Herr K. Schutz – have emphasized the need to harmonize technical standards to ensure collective effectiveness (NATO, 1967b). This position was reinforced in Memorandum 2/67, which detailed the Alliance's logistical procedures and priorities at the time (NATO, 1967a). Similarly, internal documents, such as the International Military Staff's Memorandum 2/67, recorded initial guidelines for logistical coordination among allies (NATO, 1967a).

Moreover, interoperability also involves managing available military means and coordinating between armed forces bodies, as developing a flexible doctrine requires "flexible logistical arrangements" (Ashcroft, 1970). To minimize operational redundancies and maximize rapid response capability, NATO invests in integrating common standards for equipment, procedures, and communication systems among its member states and partners.

Continuous improvement of these arrangements occurs through initiatives such as Smart Defence, which encourages the sharing of capabilities and infrastructure among allies, and the Connected Forces Initiative (CFI), which strengthens joint training and operational simulations, ensuring greater logistical efficiency and coordinated force response. The need to modernize and integrate logistical capabilities was highlighted in the 2001 Ministerial Meeting of the NAC – Final Communiqué, which promoted the adoption of interoperability and logistical cooperation initiatives (NATO, 2001). In addition, the geographical expansion of NATO's scope demands new logistical adaptations, as expeditionary missions outside the Alliance's traditional area of operation require robust infrastructure in regions with limited access to strategic resources such as fuel, ammunition, and spare parts.

Logistical interdependence within NATO reflects both the need to ensure the Alliance's operational effectiveness and the challenge of reconciling the sovereign interests of its member states. While some countries view logistical standardization as essential to collective security, others resist integration due to concerns over strategic autonomy and the protection of their national defense industries, especially in times of distrust among allies.

Thus, the normalization of NATO activities can occur in three areas: administrative, operational, and material (NATO, 2007, p. 56). Regarding logistical processes, material standards are fundamental to ensuring that resources are allocated efficiently, in accordance with the threats the Alliance seeks to address. Although operations are planned to maximize NATO's deployment capacity and sustainability, material conditions can generate externalities when standards create a cooperative supply chain model. In the defense context, logistics chains are structured into interoperable schemes, creating ties that may be difficult to undo, especially for countries that are not NATO members.

Our argument is based on how interoperability has been sustained through logistics programs, influencing the trust structure between NATO members and non-members. In this way, norms diffuse through logistics programs and provide a basis for understanding why some states, such as Brazil, maintain a degree of strategic permeability, resisting substantial changes in their defense programs in the face of political variations.

NATO's partnership model has been consolidated as an essential instrument of international collaboration and burden-sharing, especially in a global scenario characterized by complex interdependencies and diverse security challenges. At its core, this model is driven by a set of fundamental objectives guiding its action. It is sustained by a combination of formal structures and adaptive practices that allow the Alliance to accommodate divergent interests among members and partners (Webber and Hyde-Price, 2015). NATO's partnership model adopts a broad approach to global security, from strengthening regional stability to promoting political dialogue, military cooperation, and crisis management.

This article argues that Brazil's participation in the NCS, although not involving direct military commitments, constitutes a strategic pathway for expanding the DTIB, for international insertion, and for strengthening logistical standardization – even in the face of perception asymmetries between the Global North and South. To address these asymmetries, the research combined documentary analysis with a perceptions survey conducted among Subject Matter Experts (SMEs) from NATO member and partner countries. Thus, the DTIB – a set of companies, research institutions, and productive capacities dedicated to developing and supplying defense products and services – constitutes a strategic element in Brazil's international insertion.

Therefore, it is argued that NATO's logistics programs are the foundation of trust within the Alliance, paving the way for cooperation among its members. Moreover, these programs enable non-NATO partners to deepen their long-term relations regardless of internal political changes. The Brazilian case illustrates how

non-members can position themselves in the international system through these ties and commitments, demonstrating how a system of trust can be built from logistics programs.

2 METHODOLOGY

The research adopts the embedded single-case study strategy (Yin, 2003), with Brazil's participation in the NCS as the main unit of analysis and, as subunits, the mechanisms of logistical standardization and their effects on the DTIB. This design choice stems from the need to understand the interplay between technical and political dimensions within a specific institutional arrangement, in which accession does not imply formal collective defense commitments but does condition industrial standards and strategic opportunities.

The study is guided by the following central research question: how does Brazil's participation in the NCS influence its DTIB, its international insertion, and its strategic autonomy, considering the perception asymmetries between the Global North and Global South? To address this question, the study adopts three analytical propositions:

- accession to the NCS contributes to expanding Brazil's logistical interoperability without imposing political commitments to collective defense;
- logistical standardization generates benefits for the DTIB, fostering supplier diversification and access to new markets; and
- experts from the Global North tend to underestimate the strategic impacts of the NCS for Global South countries, influencing the possibilities for cooperation in alternative or hybrid models.

These propositions structure the methodological design and guide data collection, analysis, and interpretation.

Accordingly, the research is based on two complementary approaches: i) documentary analysis; and ii) expert surveys. The documentary analysis covered official NATO sources, Brazilian Ministry of Defense publications, academic works, and technical reports related to logistics and interoperability. This stage enabled mapping the historical evolution of the NCS, its functions and mechanisms, as well as identifying institutional milestones in Brazil's accession.

The documentary analysis constituted the first stage of the research and encompassed primary and secondary sources related to the NCS and Brazil's participation. Examined materials included technical manuals, minutes of working groups, ministerial communiqués, and NATO operational reports,

complemented by official documents from the Brazilian Ministry of Defense and specialized academic literature on logistics and interoperability. The documentary corpus comprised materials whose dates vary according to the type of document and the stage of NCS development, including both primary technical manuals and guidelines and more recently revised versions. This time span made it possible to capture both the historical consolidation of NATO codification standards and the adaptations introduced in recent decades, highlighting how these guidelines aligned with the process of accession and operationalization in Brazil's case.

Triangulation of these sources sought to ensure consistency between formal data and analytical interpretation, reducing the risk of biases associated with perceptions exclusively declared by involved actors.

The second stage consisted of a perceptions survey with Likert-scale questions administered to civilian and military Subject Matter Experts (SMEs) from NATO member and partner countries. The questionnaire sought to capture perceptions along three dimensions:

- impacts of the NCS on logistical interoperability;
- the relationship between standardization and national security; and
- effects on strategic autonomy.

The purpose of the instrument was not to produce statistical representativeness, but to systematize expert views and identify areas of convergence and divergence. The responses revealed a significant perception asymmetry: while Global North experts tend to value the NCS as a highly complete and complex technical system, they do not assign equivalent attention to the strategic implications of this participation for Global South countries, such as Brazil. This perception gap hinders these experts' understanding of the barriers and challenges that emerge when a country integrated into the catalog seeks to migrate from or combine this model with other collaboration arrangements.

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Integrating this qualitative data with the documentary analysis made it possible to identify that, despite political constraints and perception asymmetries, the NCS offers Brazil significant strategic advantages, including the expansion

and diversification of the DTIB, the standardization of processes and products, and access to a broader range of industrial and commercial opportunities. The analysis was conducted in a way that connected these technical and strategic dimensions, providing an integrated framework linking logistics, international insertion, and strategic autonomy.

The choice of documentary analysis as the initial research stage follows Bowen's (2009) framework, which posits that the systematization and interpretation of official and technical documents enable not only the historical reconstruction of the phenomenon under study but also the identification of institutional patterns and information gaps. In this research, this procedure enabled the articulation between normative data, logistical practices, and strategic perceptions, forming a consistent basis for the subsequent survey stage.

The combination of these two approaches – documentary analysis and structured surveys – was designed to allow an integrated understanding of the technical and strategic dimensions of Brazil's participation in the NCS. This methodological integration provides the foundation for subsequent analyses, which examine the impacts of logistical standardization on the DTIB and the strategic implications of Brazil's inclusion in NATO-led technical cooperation mechanisms.

3 NATO SYSTEM AND ALLIANCE LOGISTICS

In a statement prior to the 1967 Atlantic Summit, the German Secretary of State noted that a bloc-to-bloc relationship – West versus East – did not seem viable or efficient. The fundamental proposal linked to the stability of the international system was an individual-based approach. The document records the requirement for a study to be carried out in two phases, in which the analysis of political conditions associated with deterrence would entail a more robust NATO in the first phase. In the second phase of studies, the role of NATO's European partners and the way they would contribute to the Atlantic Alliance was presented as a determining factor for the consolidation of the Alliance.

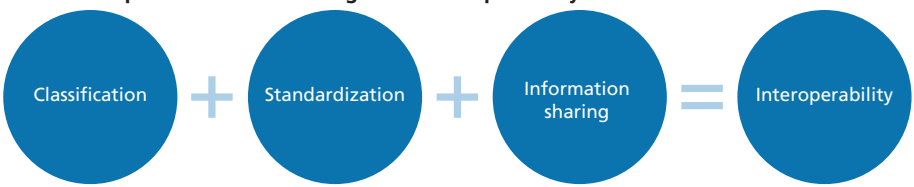
Olson and Zeckhauser (1966) characterized Alliance Theory through the lens of state robustness in relation to national interests, identifying the imbalances with which alliances must contend. Balance, therefore, is a way of aligning different interests, where states may choose to side with stronger partners or forge opposition to maintain systemic equilibrium. Although many other strategies can influence alliance formation, state behavior is shaped by its own interests, either in line with or in contrast to group interests (Oneal, 1990; Eddy and Arnett, 1998; Helbig, 2019).

Within the scope of group relations, interoperability determines the conditional variable of an alliance with regard to how members integrate into a shared doctrine. The logistical component, in this sense, refers to all supply chain efforts that enable the mobilization of resources for that purpose (Ashcroft, 1970; Komer, 1977; Beckley, 2006). Thus, the military logistics component is not merely the transfer of military assets, but the ability to manage these resources in favor of the collective defense system provided by NATO – from the initial development of capabilities and their innovation potential to replication, transfer, improvement, distribution, utilization, and operational effectiveness. Moreover, available resources should be allocated to maximize NATO's effectiveness, while more capable and functional processes ensure that resources are allocated more efficiently for operations.

NATO working groups serve to develop and enhance members' preparedness in the event that they need to operate jointly against an adversary or in other military missions. Since NATO relies on its ability to provide logistics for its operations, "logistics planning is, therefore, an essential aspect of the efficient and economical use of resources throughout their life cycle, from initial design to final disposal" (NATO, 2007, p. 8). Although these conditions apply to alliance members, the scope of doctrine and interoperable assets is broader, recognizing that partnerships add value.

Cooperation frameworks have been a key element in NATO's evolving commitment to doctrine, its demand for robust civil-military cooperation (Cimic), and its bilateral or multilateral relations (NATO, 2007). In this regard, while cooperation regimes ensure operational support, action constitutes the first step toward achieving interoperability. Standardization depends on proper classification, which creates the common ground for a combined military apparatus. This occurs in the development/sales and procurement cycles, in which information must be shared according to specific routines (Komer, 1977; Lăpădat and Comeagă, 2014). Interoperability is thus conditioned by standardization through the classification of material assets upon which the Alliance depends (Helbig, 2019).

FIGURE 1
Conceptual framework of logistical interoperability in NATO



Author's elaboration.

The Definition of Partner Nations establishes the criteria for Alliance members' commitment to the logistical system through the participation of their national military and civilian authorities. Although a political construct, NATO is defined as an alliance that strengthens member engagement through mechanisms of collective defense and mutual trust (Masala and Corvaja, 2016). Ratification of NATO standards is not mandatory for all its members or partners, but it may be a condition for deepening relationships outside the Alliance (NATO, 2007).

Logistical principles play a central role in maintaining trust and cooperation among NATO members, enabling the development of a common approach for consolidating shared strategic values. No program could develop without this common foundation in the understanding of NATO's missions and those of its members (NATO, 2007, p. 83). Thus, logistical principles such as collective responsibility, authority, cooperation, coordination, sufficiency, efficiency, flexibility, primacy of operational requirements, assured provision, and transparency are essential factors for ensuring the Alliance's operational readiness.

For example, in the context of the European Union (EU) and considering the intersection between NATO and EU member states, the logistical system functions as an integration tool that transcends the scope of the European Commission (Rynning, 2003; Helwig, 2018; Medeiros and Pinto, 2023). If cooperation is a structuring principle of alliances, logistical interoperability is a determining factor for their effective functioning. Thus, despite political guidelines set within institutional frameworks, the less visible elements of cooperation – such as standardized procedures and logistical sharing – form the basis for stable international relations, at least within certain regions and strategic spaces.

However, international relations are also shaped by postcolonial debates, which emerge as an attempt to counterbalance the efforts of global powers to maintain their status quo through structural mechanisms of domination. This context points to two distinct levels of analysis. First, there is a space where logistics is rarely considered a central political attribute, especially outside the process of shaping international regimes. Second, there is a backdrop permeated by divergent views on the foundations of stability in the international system.

A long-standing debate questions whether cooperation is, in fact, a determining factor for the stability of international systems, even under the lens of hegemonic stability theory (Snidal, 1985). A classic institutionalist approach would consider cooperation mechanisms within an environment characterized by regular flows of trust and the exchange of strategic information. However, such cooperation frameworks are structured not only through state norms and positions but also through the effectiveness of established rules. If we interpret logistical standardization as a protocol aimed at instrumental or technical

cooperation, we can better understand the impacts of imbalances within regimes such as military alliances (Murdoch, 1995; Masala and Corvaja, 2016).

On the other hand, imbalances manifest as unstable conditions within the states that form part of a regime or alliance. Little attention has been given to how cross-cutting programs that go beyond traditional regimes establish systemic and systematic foundations for international governance. Formal agreements or institutional cooperation mechanisms are not always sufficient to prevent disputes (Beckley, 2006; Helbig, 2019). At an initial level, states combine distinct interests and capacities to maintain group cohesion, although this does not completely eliminate internal tensions within regimes. At a deeper level, state positions are determined by specific political trajectories, creating structural dependencies that influence their choices within collective regimes or cooperative alliances.

Reducing these imbalances represents a significant challenge. The main achievement of institutional structures lies not only in the prevention of violence but also in the promotion of systemic stability (Gaddis, 1986). Theory suggests that reducing imbalances contributes to system stability. However, international regimes only partially achieve this goal, as other structural imbalances persist within alliances. Moreover, given the security dilemma – which can generate insecurity in an inversely proportional relationship to alliance expansion – imbalances external to regimes can directly interfere with the international environment.

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4 LOGISTICS PROGRAMS AND EXTRA-NATO COOPERATION

NATO's logistics programs are promoted by the Conference of National Armaments Directors (CNAD), which periodically brings together the national directors responsible for armaments with the mission of providing the means for life-cycle processes to be applied to NATO projects and armaments cooperation (NATO, 2003). The group's leadership is exercised by a chairperson appointed by the national delegates for a two-year term, while the remaining positions are filled through appointments from the planning group.

The working group classified as AC/235 operated within NATO's Naval Armaments Group, with its functions varying over the years under different institutional formats. The so-called Defense Research Group held its first meeting in 1967 and absorbed, for example, study group no. 2 of AC/235. This group became an essential facilitator among Alliance member states, and a strong source of advice and support for military forces, as revealed in its founding documents (NATO, 1967a). The main feature of this working group is its reliance on protocols that ensure future interoperability, grounded in a common language and mutual assistance among Alliance members. Primary interoperability presumes that operations can be coordinated based on standardized systems and compatible protocols. However, beyond the technical interoperability agreed upon later through semantic interoperability, processes and operational sequencing consolidate the principles of these protocols.

The effectiveness of these mechanisms naturally depends on identifying and classifying the means available. The contemporary format of AC/235, which structures the NCS, allows for the management of military assets through a common language and a classification protocol (Medeiros and Moreira, 2018). It is important to note that military operations, by their very nature, require adaptable and flexible means to operate in a complementary and integrated manner. Moreover, in light of the need for defense, preparation, or response to conflicts, available means require replacement, modernization, and ongoing sustainability.

Decades later, the Life Cycle Management Group (LCMG) advanced the issue of logistical planning by focusing efforts on renewing capabilities, thereby avoiding periods of logistical vulnerability. A NATO document (2003) points out that, in the post – Cold War period, various revisions impacted working groups and committees. The Council Committee Review, approved in 2002, indicated the need to streamline these groups, leading to the merger of CNAD AC/2502, AC/3013, AC/3134, and AC/3255 and their substructures into the CNAD Life Cycle Management Group (LCMG), designated AC/327. Among the topics addressed by CNAD AC/327 are those covering a broad range of functions across the life cycle of defense assets. These include essential requirements,

logistics integration, asset security, obsolescence, risk management, costs over the production and use cycle, as well as contracting modalities and processes.

Life Cycle models and processes are fundamental to NATO's ability to assess operational risks and uncertainties (Smit, 2009). Centralizing the work within the Life Cycle Management Group ensured the distribution of responsibilities among ad hoc working groups (AHWGs), focused on: i) policy; ii) program and work structure; and iii) ongoing activities. These subgroups were led by countries with robust military capabilities – namely, the United States, Canada, and Norway, respectively. Maintaining working groups specialized in logistical capabilities allows NATO to ensure its cohesion and guarantee the provision of strategic resources (Pecina and Husak, 2018). Eddy and Arnett (1998) note that the military assets associated with the NCS in the United States not only integrate NATO supplies but also serve the interests of other countries, including NATO-sponsored and other allied nations, representing nearly 30% of the total in the years corresponding to their publication.

In the AC/327 consolidation document (NATO, 2003), some members are listed as part of each of the subgroups, revealing that Portugal and Spain do not appear in any of these structures. Participation is classified as either members or observers, with observers being representatives from other NATO bodies. In contrast, members include both NATO member states and representatives from partner nations. NATO's partnerships are based on shared values, mutual respect, and a willingness to cooperate on common security challenges. This model reflects the Alliance's view of promoting international stability and security through constructive engagement with various countries and organizations. After 2001, a comprehensive review of the scope of all ongoing programs and partnerships was conducted, reassessing previously established guidelines (NATO, 2001).

Helbig (2019) argues that, although NATO does not deliberately promote cooperation programs with external state actors, partnerships often emerge from the interest of the partners themselves. In this sense, some nations seek opportunities for technical and strategic alignment with the Alliance, aiming for benefits in interoperability, access to logistical standards, and enhanced military capabilities.

Brazil, as one of the countries with diplomatic relations and technical cooperation with NATO, has adopted a pragmatic stance toward the Alliance. Although it is not formally a NATO global partner, Brazil participates in bilateral and multilateral initiatives that align with standards established by the organization, particularly in areas such as maritime security, logistical interoperability, and technological cooperation in defense. Brazil's relationship with NATO is largely indirect and selective, guided by specific strategic interests

such as modernizing its defense industrial base, accessing new technologies, and participating in international military standardization programs. However, unlike other countries with formal NATO global partner status – such as Colombia – Brazil maintains a degree of strategic autonomy in its defense policy, avoiding formal commitments that might limit its flexibility in coalitions and regional blocs (Ramalho da Rocha, 2022).

Furthermore, in the context of the NCS, there is growing interest in harmonizing certain logistical processes and technical standards that allow for greater integration of Brazil into global defense networks, though this does not aim to compromise its sovereignty or create automatic alignment with the Alliance. This approach underscores the selective and pragmatic nature of Brazil's participation, which seeks to absorb technical benefits without fully adhering to NATO's normative model. Conversely, the absence of Portugal and Spain in AC/327 subgroups indicates that participation in NATO's logistics structure is not uniform among Alliance members and varies according to national interests and strategic priorities. Similarly, Brazil, by engaging with NATO in an indirect and pragmatic way, has evaluated cooperation opportunities in specific sectors, maintaining relative strategic autonomy in line with its multilateral foreign policy.

5 BRAZIL IN NATO'S TECHNICAL COOPERATION SYSTEM

In recent decades, Brazil has intensified its participation in joint military exercises and sought alignment with international defense standards. Since the promulgation of the 1988 Constitution, which restored democracy in the country, and the creation of the Ministry of Defense in 1999, Brazil has consolidated its defense institutions and expanded its presence in international forums. This trajectory reflects a commitment to the modernization of the Armed Forces and the pursuit of greater insertion in the global security arena. Brazil's inclusion in the NATO Catalogue represents its first significant participation in logistical and strategic planning directly linked to the development of its Technological and Industrial Defense Base.

As an actor in the international system, Brazil has historically been perceived as maintaining a long-term oppositional stance toward NATO. However, this opposition has not been characterized by outright rejection of the Alliance, but rather by a selective form of bandwagoning aimed at protecting the national defense industry and arms manufacturers, rather than pursuing collective security (Helbig, 2019, p. 192). This perspective partially aligns with Schweller's (1994) interpretation, which argues that Brazil's cooperation with NATO is guided by specific national interests, but not necessarily configured as direct opposition. Helbig (2019), on the other hand, challenges this reading by suggesting that

Brazilian resistance is manifested mainly in foreign policy, and not necessarily in the refusal of technical-military cooperation with NATO.

Brazil's participation in the NCS marks a turning point in its defense strategy and in the way the country engages with international security markets. According to Medeiros and Moreira (2018), this adherence not only enabled the standardization of military supply logistics management but also facilitated the integration of Brazil's DTIB into a global defense ecosystem, increasing transparency and interoperability of national products and services. The NCS represents more than just a technical catalogue; it functions as a strategic planning and international insertion tool, enabling Brazil's participation in global military supply chains.

The adoption of this system allowed Brazil to progress from Tier 1 to Tier 2 within the NCS, making it possible to publish and integrate its logistical data into NATO's database. This move expanded the visibility of the national industry, allowing access to new markets and promoting the internationalization of Brazilian defense sector companies (Medeiros and Moreira, 2018, p. 191).

The main strategic advantage of this inclusion lies in the rationalization and efficiency of the defense products' life cycle, as well as the ability to align national industrial standards with those adopted by NATO member states and partners. This alignment enables Brazil's DTIB to develop products compatible with international requirements, facilitating exports and industrial partnerships with NATO countries without requiring formal accession to the Alliance.

6 RESULTS

To assess the reception of the topic among SMEs, three guiding questions were posed in a perceptions survey administered to military and civilian specialists from NATO member and partner countries. The Likert scale was used as a device to register expert views in comparable terms, without aiming for statistical representativeness. The analysis emphasized interpretative patterns emerging from the discussion of interoperability, national security, and strategic autonomy.

Regarding logistical interoperability, SMEs highlighted tangible benefits of Brazil's participation in the NCS, such as enhanced compatibility with international standards and modernization of logistical practices. This supports the study's hypothesis that integration into NATO technical networks does not necessarily imply geopolitical alignment, but rather a pragmatic investment in modernization and standardization. On the issue of national security, perceptions diverged. Some respondents pointed to opportunities for access to technologies, cyber defense, and logistical capacities, while others questioned the extent to which these gains could influence Brazil's broader defense policy.

Finally, when addressing strategic autonomy, a smaller group expressed concerns about possible dependency on NATO frameworks, while most respondents underscored the pragmatic and selective character of Brazil's engagement. These findings illustrate the tension between cooperation and autonomy, and they reinforce the interpretative value of the perceptions survey for understanding Brazil's approach to NATO technical programs. Although the Likert scale was employed to capture gradations in perception, the analysis focuses on interpretative trends rather than numerical distributions, underscoring the qualitative nature of the results.

The figure presents the results of the survey conducted with SMEs on Brazil's participation in NATO technical programs, based on a Likert scale. The data reflect respondents' perceptions on three central questions: i) whether Brazil's participation improves its logistical interoperability; ii) whether adherence to the NATO Catalogue strengthens national security; and iii) whether involvement with NATO compromises Brazil's strategic autonomy.

The results show that the majority of experts agree that interoperability is enhanced through cooperation with NATO, while opinions remain divided regarding national security. Furthermore, most respondents reject the idea that this participation undermines Brazil's strategic autonomy, suggesting that Brazil's engagement with NATO is pragmatic and selective.

These findings underscore the need for a balanced approach in formulating Brazilian defense policy. On one hand, logistical and technical integration with NATO can yield operational benefits and contribute to the modernization of the Armed Forces. On the other hand, challenges inherent to this cooperation, such as potential constraints on Brazil's freedom of action in sensitive international policy areas, must be considered. Accordingly, the study indicates that trust-building through logistics is not a unilateral phenomenon but rather a dynamic process dependent on factors such as sovereignty management, diversification of partnerships, and the establishment of clear boundaries for Brazil's participation in NATO initiatives.

Overall, these results enhance the broader understanding of NATO's role in global security governance and illustrate how non-member countries like Brazil interact with the Alliance. The Brazilian case demonstrates that participation in technical and logistical networks can be strategically advantageous without necessarily implying a shift in the country's geopolitical orientation, preserving diplomatic flexibility while granting access to capabilities and innovations in the defense sector.

7 CONCLUDING REMARKS

This study focused on the dimension of trust created by NATO's logistical programs in their interface with non-member states. The case study of Brazil allowed for an in-depth assessment of how a non-NATO partner interacts with these programs and the most significant effects on building long-term and resilient trust systems. In the context of defense logistics and interoperability, programs involving non-members provide highly sustainable instruments, as they are less vulnerable to rapid political shifts.

Despite domestic political changes and cyclical orientations regarding partnerships with actors like NATO, logistical programs help consolidate long-term relations and strengthen the role of technical cooperation, situated within the broader framework of defense diplomacy (Almeida Silva, 2015). NATO's logistical partnership model exemplifies unique international collaboration, demonstrating the potential of multiple nations and organizations working together to enhance global security. By promoting a common logistical language, the model enables constructive engagement and establishes standards that shape the often-invisible micro-relations between states.

Brazil's participation in the NATO Catalogue and the Defense Product Life Cycle occurs amid profound transformations in international security governance, characterized by strategic instabilities and the rise of unilateral and isolationist tendencies among Western powers. The reelection of Donald Trump had significant impacts on NATO and the U.S.-led military alliance system, progressively undermining traditional trust mechanisms among member states (Tardy, 2025). By prioritizing U.S. domestic interests, Trump employed financial and political pressure on NATO allies, demanding higher defense investments and signaling a reduced commitment to European security. This scenario prompted the EU to accelerate the development of a more autonomous defense model, consolidating strategic documents aimed at strengthening European military autonomy, while still benefiting from NATO's framework.

The evolving NATO context, marked by erosion of internal trust and the need to adapt to increasing multipolarity, has direct implications for non-member countries like Brazil, which maintain selective technical cooperation with the Alliance. Brazil, traditionally pragmatic in its foreign policy, views participation in NATO logistical programs as a strategy to modernize its DTIB and expand its capacity to export military equipment to markets regulated by Western standards. The adoption of the NCS facilitates access to international certifications and improves the logistical interoperability of the Armed Forces, enhancing operational efficiency. However, this occurs in an environment where NATO

itself faces questions about its future role, making the long-term benefits of deeper engagement uncertain.

The war in Ukraine, which initially reinforced NATO by reaffirming its relevance to European security, also exposed vulnerabilities in the Alliance's defense supply chain. Massive arms deliveries to Ukraine depleted strategic arsenals among NATO members, increasing the demand for new suppliers and partners capable of filling gaps in military production. By aligning with NATO logistical standards, Brazil becomes a potential defense supplier at a time of reconfiguration of global military production chains. Yet, this opportunity must be weighed against the new geopolitical context: with the United States increasingly focused on domestic agendas and Europe seeking autonomous defense capabilities, NATO's centrality as a Western military coordination hub may decline, rendering long-term cooperation outcomes uncertain.

Furthermore, the escalation of the Israel-Palestine conflict introduced new challenges to NATO's credibility and cohesion. The use of Western weapons in highly controversial military operations has heightened tensions within the Alliance, with some member states contesting unrestricted arms supply policies. This erosion of cohesion and Europe's pursuit of greater military independence suggest that Brazil should adopt a cautious approach in participating in NATO technical programs. Strengthening logistical interoperability can yield significant benefits for the Brazilian defense industry and other South American countries that look to Brazil as a regional reference.

In this regard, cooperation with strategic European partners, such as Sweden – which recently joined NATO in combat aircraft development – and France in nuclear submarine construction, illustrates a trend combining interoperability with investments in technological autonomy and technology transfer. Brazilian defense policy, traditionally focused on autonomy and flexibility, seeks to balance reliance on established standards with increasing capacity for development, procurement, and export, all of which are sensitive to changes in NATO's political configuration.

The rise of Trump in the U.S. and his transactional approach to foreign policy highlight that multilateral commitments can be quickly undermined if not anchored in concrete and sustainable interests for all parties. For Brazil, this means that integration into Western logistical networks must be balanced with domestic investments in defense technology and multilateral cooperation with other blocs, such as BRICS and South America. Participation in the NATO Catalogue and the Defense Product Life Cycle has served as an instrument to modernize Brazil's DTIB and expand integration into global military

supply chains without implying a realignment of its defense strategy. Brazilian involvement in these programs has been pragmatic and technical, focusing on logistical interoperability and certification of national products for international markets, without compromising strategic decision-making autonomy.

The current global scenario, characterized by U.S. isolationism under Trump and Europe's move toward autonomous defense, places NATO in a phase of internal reconfiguration (Lambert-Deslandes and Hlatky, 2025). While the Alliance continues to set operational and logistical standards, its political cohesion is increasingly questioned, affecting predictability for non-member countries like Brazil. In this context, Brazil's engagement in NATO logistical programs occurs alongside the strengthening of bilateral partnerships, such as agreements with Sweden in the aerospace sector and with France in nuclear submarine development, demonstrating that Brazilian defense policy maintains multiple cooperation axes even within the technical standards of these subsystems.

The current NATO dynamics, with Europe consolidating independent military capabilities and reduced U.S. influence within the Alliance, do not alter Brazil's selective and instrumental participation logic. The country continues to leverage its diplomatic flexibility to gain technical and industrial benefits without compromising strategic maneuverability in an increasingly fragmented international system.

REFERENCES

ALMEIDA SILVA, Antonio Ruy de. A diplomacia de defesa na política internacional. **Revista da EGN**, v. 21, n. 2, p. 179-202, 2015.

ASHCROFT, G. **Military logistics systems in NATO**: the objective of integration. Part II: Military Aspects. London: Institute for Strategic Studies, 1970.

BECKLEY, P. Revitalizing NATO's Once-Robust Standardization Program. **New Political Economy**, v. 11, n. 4, p. 499-518, 2006.

BEER, F. A. **Integration and disintegration in NATO**: alliance cohesion processes and prospects for the Atlantic Community. Columbus: Ohio State University Press, 1969.

BOWEN, Glenn A. Document analysis as a qualitative research method. **Qualitative Research Journal**, v. 9, n. 2, p. 27-40, 2009. DOI: https://doi.org/10.3316/QRJ0902027.

EDDY, B.; ARNETT, S. The NATO Codification System: a bridge to global logistics knowledge. **The Disam Journal**, v. 12, 1998.

GADDIS, J. L. The long peace: elements of stability in the postwar international system. **International Security**, v. 10, n. 4, p. 99-142, 1986.

HELBIG, R. **Why states cooperate with NATO?** Threats, interests, and status as drivers of external states' foreign policy towards the alliance. Dissertation (Doctoral Degree) – Universität der Bundeswehr München, Neubiberg, 2019.

HELWIG, N. **New tasks for EU–NATO cooperation**: an inclusive EU defence policy requires close collaboration with NATO. Berlin: SWP, 2018. (SWP Comment, n. 4/2018). Available at: https://nbn-resolving.org/urn:nbn:de:0168-ssoar-56215-8.

KOMER, R. W. Ten suggestions for rationalizing NATO. **Survival**, v. 19, n. 2, p. 67-72, 1977. Available at: https://doi.org/10.1080/00396337708441668.

LAMBERT-DESLANDES, É.; HLATKY, S. von. NATO, nuclear deterrence and disarmament in an age of US ambivalence. **Defence Studies**, p. 1-8, 2025.

LĂPĂDAT, Dan; COMEAGĂ, Cornel. 10 years of logistics in NATO. **Romanian Military Thinking**, n. 1, 2014.

MASALA, C.; CORVAJA, A. S. Alliances. In: COLLINS, A. (Ed.). **Routledge handbook of security studies**. London: Routledge, 2016. p. 349-359.

MEDEIROS, Sabrina Evangelista; MOREIRA, William de Sousa. The mobilization of the defense industrial base in South America through the Brazilian admission in the NATO Catalog System. **Austral**: Brazilian Journal of Strategy & International Relations, v. 7, n. 14, 2018. Available at: https://doi.org/10.22456/2238-6912.87993.

MEDEIROS, Sabrina Evangelista; PINTO, Danielle Jacon Ayres. Portuguese Participation in the EU PESCO and NATO as an Interoperability Hub. **Portugal Since the 2008 Economic Crisis**. London: Routledge, 2023. p. 222-240.

MURDOCH, J. C. Military alliances: theory and empirics. In: HARTLEY, K.; SANDLER, T. **Handbook of defense economics**. Amsterdam: Elsevier, 1995. v. 1. p. 89-108.

NATO – NORTH ATLANTIC TREATY ORGANIZATION. **Memorandum 2/67**. Brussels: NATO, 3 jan. 1967a. (IMS Control, n. 0386).

NATO – NORTH ATLANTIC TREATY ORGANIZATION. **Declaration by the German Secretary of State for Foreign Affairs, Herr K. Schutz**. Brussels: NATO, 15 fev. 1967b.

NATO – NORTH ATLANTIC TREATY ORGANIZATION. **Ministerial Meeting of the NAC**: final communiqué – M-NAC/2(2001)158. Brussels: NATO, 6 dez. 2001.

NATO – NORTH ATLANTIC TREATY ORGANIZATION. **CNAD Life Cycle Management Group (LCMG)**: terms of reference and work structure – AC/259-D(2003)23-ADD1-AS1 (INV). Brussels: NATO, 16 jul. 2003.

NATO – NORTH ATLANTIC TREATY ORGANIZATION. **NATO logistics handbook**. Brussels: NATO, 2007.

NATO – NORTH ATLANTIC TREATY ORGANIZATION. **Standardization agreement**: Stanag 3150 – uniform system of supply classification. Brussels: NATO Standardization Office, 2019.

OLSON, M.; ZECKHAUSER, R. An economic theory of alliances. **The Review of Economics and Statistics**, p. 266-279, 1966.

ONEAL, J. R. The theory of collective action and burden sharing in NATO. **International Organization**, v. 44, n. 3, p. 379-402, 1990.

PECINA, M.; HUSAK, J. Application of the New NATO Logistics System. **Land Forces Academy Review**, v. 23, n. 2, p. 121-127, 2018. Available at: https://sciendo.com/article/10.2478/raft-2018-0014.

RAMALHO DA ROCHA, A. J. Brazil and NATO in a Multipolar World. **Cadernos Adenauer**, n. 3, 2022.

RYNNING, S. Why not NATO? Military planning in the European Union. **The Journal of Strategic Studies**, v. 26, n. 1, p. 53-72, 2003.

SCHWELLER, R. L. Bandwagoning for profit: bringing the revisionist state back in. **International Security**, v. 19, n. 1, p. 72-107, 1994.

SMIT, M. **NATO initiatives to improve life cycle cost**. Brussels: NATO, 2009. (Paper presented at NATO-RTO SAS Panel).

SNIDAL, D. The limits of hegemonic stability theory. **International Organization**, v. 39, n. 4, p. 579-614, 1985.

TARDY, T. NATO at 75: enduring and moving forward? **Defence Studies**, p. 1-9, 2025.

WEBBER, M.; HYDE-PRICE, A. (Ed.). **Theorising NATO**: new perspectives on the Atlantic Alliance. London: Routledge, 2015.

YIN, Robert K. Designing case studies. **Qualitative research methods,** v. 5, n. 14, p. 359-386, 2003.

YIN, Robert K. Case study research: design and methods. Sage, 2009.

YOHO, K. D.; RIETJENS, S.; TATHAM, P. Defence logistics: an important research field in need of researchers. **International Journal of Physical Distribution & Logistics Management**, v. 43, n. 2, p. 80-96, 2013.