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Protecting national sovereignty: the strategic use of trade secrets in technology transfer by the Brazilian Air Force

Protegiendo la soberanía nacional: el uso estratégico del secreto industrial en la transferencia de tecnología por parte de la Fuerza Aérea Brasileña

Abstract: This study analyzes the trade secret protection approach for technologies developed by the Brazilian Air Force, comparing it to the patent system from the perspective of national sovereignty. Via documentary and bibliographic research, data from the Air Force's Innovation Management Coordination from January 2023 to June 2025 were analyzed. The results show a clear predominance of trade secrets, which accounted for 77% of the 26 technology transfer negotiations during this period. The evidence suggests that this strategy is advantageous for safeguarding sovereignty, aligning itself with defense policies and enabling controlled technology transfer to foster the defense industrial base. The adopted management model, which balances trade secrets and patents, effectively reconciles the protection of strategic assets with the technological development of Brazil.

Keywords: Trade secrets; National sovereignty; Defense industrial base; Aerospace science and technology; Brazilian Air Force.

Resumen: El objetivo de este artículo es analizar el enfoque de protección del secreto industrial para las tecnologías de la Fuerza Aérea Brasileña, comparándolo con el sistema de patentes desde la perspectiva de la soberanía nacional. Mediante una investigación documental y bibliográfica, se analizaron datos de la Coordinación de la Gestión de la Innovación del Comando de la Aeronáutica entre enero del 2023 y junio del 2025. Los resultados demuestran el predominio del secreto industrial, que corresponde al 77% de las 26 negociaciones de transferencia de tecnología realizadas durante el período. Las evidencias sugieren que esta estrategia es ventajosa para resguardar la soberanía, alineándose con las políticas de defensa y permitiendo la transferencia controlada de tecnología para fomentar la base industrial de defensa. El modelo de gestión adoptado, que equilibra el uso de secretos y patentes, demuestra ser eficaz para conciliar la protección de los activos estratégicos con el desarrollo tecnológico del país.

Palabras clave: Secreto industrial; Soberanía nacional; Base industrial de defensa; Ciencia y tecnología aeroespacial; Fuerza Aérea Brasileña.

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1 INTRODUCTION

Research, development, and innovation in aerospace and defense are fundamental for Brazil's development and for the fulfillment of the constitutional mission of the Brazilian Air Force. As an institution with a field of action and key activities that completely depend on high technology, the Brazilian Air Force has since its beginning invested in science, technology, and innovation (ST&I) as part of its complementary activities in line with national needs via its scientific, technological, and innovation institutions (STI). However, its interests in ST&I follow neither market nor business matters, requiring a specific approach regarding technology transfer by its Technological Innovation Center (TIC).

Although the organizational structure of the Air Force (COMAER) has a sector dedicated to aerospace science and technology, the Department of Aerospace Science and Technology, contained in Decree no. 11,237, of October 18, 2022 (Brasil, 2022), had no systemic structure to centrally manage the intellectual property assets from Air Force research institutes up to 2016. The Air Force Innovation System (SINAER) was only created in 2017 to technically and normatively coordinate and guide the COMAER Innovation Management Coordination (IMC) to maximize the development of scientific-technological solutions for aerospace power and contribute to the maintenance of airspace sovereignty and national integration (Brasil, 2023).

According to Leite *et al.* (2023), the Swedish model for innovation management—based on the concept of the Triple Helix (Etzkowitz; Leydesdorff, 1995)—inspired SINAER. It aimed to boost innovation with technology transfer and to promote synergistic actions between government, academia, and industry toward comprehensive benefits for the Brazilian society.

As in all science and technology institutions in Brazil, COMAER also aims to protect its creations (especially those technologies considered strategic or critical) to guarantee a certain degree of technological autonomy and safeguard the assets that ultimately belong to Brazil and form part of the basis of its instruments of national sovereignty.

This study deems national sovereignty beyond its classic legal dimension, approaching it in its practical and technological meaning: the capacity of the state to preserve its decision-making autonomy in the face of external actors. In this perspective, sovereignty manifests itself by the ability to deny potential adversaries or competitors access to critical and sensitive technologies and by the ability to sustain, retain, and use national strategic competencies in an independent and resilient manner (Girardi; Galdino, 2024; Longo, 2007; Longo; Moreira, 2009). In sectors such as aerospace and defense (marked by power asymmetries, technological curtailment, and disputes over sensitive knowledge), the protection of technological assets is no longer just a choice regarding the management of intellectual property, becoming part of the material conditions that sustain the freedom of action of a state and its national sovereignty.

According to the guidelines of the Brazilian National Defense Strategy and the Intellectual Property Policy of the Brazilian Ministry of Defense (MD), protecting sensitive knowledge and preserving technologies generated within Brazilian defense STI constitute necessary measures

to reduce vulnerabilities associated with external dependence on components, inputs, services, and critical knowledge (Brasil, 2021b; Brasil, 2024b).

Thus, mitigating embargoes and technological curtailment means avoiding access restrictions while also establishing institutional, industrial, and scientific conditions to ensure operational continuity, maintenance capacity, self-development, and sovereign supply of defense products and systems even under political pressure, international instability, or market restriction (which can be understood as technological sovereignty). Thus, the strategic control over technological assets starts to play a central role in the resilience of the Brazilian defense industrial base (DIB) and in the maintenance of the technological and productive autonomy required to meet national defense objectives (Brasil, 2021a, 2024b).

Barbosa (2003) details what is provided for in the Industrial Property Law, Law no. 9,279, of May 14, 1996 (Brasil, 1996), in which the state requires a detailed description of a technology to grant it a patent so that technicians can reproduce the invention. Thus, if a patent guarantees its holder the exclusive right to commercially exploit the protected technology, companies and even countries may silently start using knowledge they neither developed nor acquired (Longo; Moreira, 2009).

If, on the one hand, the patenting of technologies contributes to the technological advancement of Brazil as a whole, on the other hand, the dissemination of technological advances by patents publicly provides clues and creative solutions to complex problems, a problematic aspect in cases that affect national defense. Thus, technological innovation research faces serious challenges regarding confidential subjects, as is usually the case with military research (Heeren *et al*., 2024).

On the other hand, trade secrets houses a wide range of coverage, more comprehensively supporting the innovation ecosystem and being able to protect experimental research, processes, products, failed experiments, and negative know-how (the knowledge of what does not work or the paths to be avoided) (Ozcan; Pickernell; Trott, 2024; Searle, 2021)

In a global scenario marked by geopolitical competition and risks of industrial espionage, the choice between patent and trade secrets emerges as a critical decision to safeguard sovereignty and national security. While the former requires public disclosure of technical details, the latter can perpetuate secrecy as long as effective management maintains it with the support of robust legal and contractual mechanisms, especially in cases of technology transfer.

To guide ST&I projects of interest to defense, MD Ordinance GM-MD no. 840, of February 14, 2025, establishes the technologies currently considered critical (Brasil, 2025). This document guides research and development toward finding technologies that seek to reduce dependence on foreign solutions, strengthen the Brazilian DIB, and increase the capabilities to maintain the national sovereignty.

The IMC is COMAER's TIC, and although a dynamic and very proactive body, it underwent significant restructuring in 2023. Santos *et al*. (2024) show evidence of the relevance of this restructuring, finding a significant increase in the number of patents registered by SINAER

STI in 2023 (which represented in a single year 80% of the amount filed from 2017 to 2022, i.e., since the creation of SINAER). Its strategy to promote innovation in Brazilian defense industries requires that interested parties can align their business strategies with prospective visions of national defense.

Analyzing IMC technology negotiation records from January 2023 to June 2025 shows that several DIB companies have adhered to the COMAER approach (Coordenadoria de Gestão da Inovação, 2025). In two and a half years, 26 technologies underwent negotiations in 30 months, most of which are protected by trade secrets.

This study aims to compare trade secrets to patents regarding COMAER technologies. It also aims to assess whether protecting such assets via trade secrets offers COMAER any advantages (due to its central concern with national sovereignty). This study differs from others by the scarcity of research on the policies and actions from the Brazilian Armed Forces TIC, exploring a specific aspect of the national production system, i.e., the transfer of technology to the DIB via trade secrets.

This study consists of four sections. In addition to this introduction, its second section addresses the theoretical review and methodology in this research. Its third section describes the results and analyses, whereas its fourth one outlines its conclusions and proposals for future studies.

2 THEORETICAL REVIEW AND METHODOLOGY

The National Defense Strategy provides for efforts to develop ST&I in defense to reduce the Brazilian dependence on international technology (Brasil, 2024b). However, the intellectual property assets from such research must be protected so that these efforts and investments can be translated into results for COMAER and the Brazilian society.

The MD Intellectual Property Policy lists actions to ensure the confidentiality of sensitive and strategic knowledge (essential to national defense) and to institute protocols to protect and regulate the supply of strategic intellectual property for national defense (deemed strategic) (Brasil, 2021b). This defense ST&I policy also encourages the civilian application of military scientific-technological knowledge as long as such use does not compromise national security (Brasil, 2021a).

Finally, to achieve national autonomy in the development and sustainability of defense products, the Air Force Military Strategic Plan guides the aerospace sector to create new technologies and skills to reduce external dependence and mitigate embargo by developing the COMAER STI and strengthening the DIB (Brasil, 2024a).

This normative framework supports the strategy of protection by trade secrets in public management, especially in defense since direct public investments in research and development of technologies that decisively contribute to national sovereignty entail a legitimate concern about

denying other countries access to the produced technological assets whether they be potential adversaries, customers, or commercial competitors.

Since the promotion of defense innovation decreases dependence on foreign technologies (Santos, 2016)—and the fact that countries cannot forgo the capacity to manufacture the defense means they need for such promotion—according to Cunha and Amarante (2011), protecting technological assets proves an imperative activity to maintain the defense innovation conditions that provide the necessary circumstances for national defense.

However, such protection constitutes a complex challenge that involves balancing the need to safeguard sensitive or strategic information and promoting technology transfer to the national industry to strengthen and contribute to the sustainability of the DIB production chain. Moreover, protecting the industrial and intellectual property assets in the military industry configures an imperative objective (due to the strategic nature of defense system technologies) to maintain a competitive advantage (Langlois; BenMahmoud-Jouini; Servajean-Hilst, 2023).

This insight is in line with Heeren *et al*. (2024), who state that the risk is especially high for military structures protecting secrets regarding essential capabilities and export-controlled technologies. Weapons system technologies, for example, require secretive development, and their intellectual property should only circulate in the closed ecosystem of the defense industry.

Defense geopolitics is marked by a double game: while dominant nations seek to consolidate their military technological sovereignty, they actively restrict the access of developing countries to sensitive technologies. This strategic maneuver aims to perpetuate the *status quo* and dictates the rules of world power (Girardi; Galdino, 2024).

Countries engage in neither education nor trade in the most critical and complex parts of cyber, nuclear, or space technologies because the most technologically advanced countries know that they maintain a tactical, operational, or strategic advantage in the event of an armed conflict by denying other nations access to certain products or technologies. Moreover, the most advanced military technologies constitute fundamental factors regarding the use of military power in deterrence strategies in geopolitical issues, expanding the range of possibilities regarding the military expression of national power.

Examples abound with such technological curtailment. As in Girardi and Galdino (2024), Brazil has been and continues to be the target of technological curtailment in several areas. The authors mention several cases, including the influence of Israel on the Brazil-Iraq nuclear agreement, the U.S. blockade of Brazilian access to items from U.S. companies for use in the Navy submarine program of the latter, the closure via German commercial interference of the Brazilian production of hydroxylated liquid polybutadiene (used in civil, petrochemical, and industrial construction and to produce rocket propellants), and the denial of sale, by a United States company, of a special resin the Brazilian Army would use in research and development of solutions for modern thermal vision cameras that would also have wide application in civilian surveillance systems and medicine.

The geopolitical context includes strictly military and sovereignty aspects. However, control of these technologies greatly impacts the generation of jobs and the transfer of certain technologies for dual use (military and civilian). Contractor (2019) states that the Committee on Foreign Investment in the United States[1] is increasing restrictions on U.S. transactions with foreign companies by alleging a risk to national security. The author also says that this has been interpreted both regarding military and dual-use technologies and those that can advance research and development by other nations.

Ozcan, Pickernell, and Trott (2024) have recently found a global trend in which the use of trade secrets surpasses that patents as a mechanism for protecting innovation. For example, 70% of companies in the United Kingdom have adopted this practice regardless of their size or sector of operation to safeguard their intellectual assets (Searle, 2021).

Since intellectual property also includes safeguarding strategies related to trade secrets—as in Santos (2018)—Cepik (2003) states that secrecy consists of a kind of knowledge containment that is based on a scenario of potential penalties associated with undue externalization. In the case of an armed force, such punishment could take many forms, such as loss of the surprise factor due to the dissemination of a technology or invention that unbalances the battlefield or strengthens a potential enemy; both cases could mean a threat to national sovereignty.

Since the IMC is the Air Force TIC, this study collected rules, doctrinal documents, and institutional policies to assess whether these instruments address trade secrets and under which aspects.

This applied analysis with exploratory objectives uses theoretical knowledge to analyze the COMAER use of trade secrets to protect scientific assets in technologies critical for Brazilian national defense. Bibliographic and documentary research were used in this study (Prodanov; Freitas, 2013).

IMC data were collected on June 20, 2025, by searching the restricted access control spreadsheets with confidential data that, for this reason, this study is unable to fully transcribe or describe. The tables and graphs of the data were elaborated on Microsoft Excel to facilitate the visualization of the results obtained.

Regarding the population, sample, and scope of this study, records of protected assets within the SINAER's 17 STI and technology transfer negotiations (completed or in progress) from 2023 to 2025 were surveyed to compose the proposed analyses. This time frame was selected because in 2023 the IMC underwent significant restructuring, which included changes in its administrative structure and especially in its mentality and approach to innovation management of COMAER assets.

1 An interagency body of the U.S. government that reviews transactions involving foreign investment in the United States to determine the effects of such transactions on its national security.

Once the regulatory and doctrinal frameworks were carried out, a bibliography was used to support the analyses on the use of trade secrets by the Air Force TIC under the perspective of national sovereignty.

The studied period (2023 to 2025) was established to observe the recent behavior of the IMC since this technological innovation center underwent a period of development and organization in previous years (consolidating itself in a better, more structured way). The values and impacts of the transferred technologies also limited this study as these are confidential subjects.

3 RESULTS

On the SINAER website, the IMC makes available, in its technological showcase, a list of technologies ready to be transferred[2]. Some are patent-protected technologies, whereas others are trade secret-protected technologies (TSPT), confirming Searle (2021), who states that trade secrets can substitute or complement patents. However, some available TSPT remain undisclosed as they are considered critical or too sensitive. Their transfer must follow criteria that most carefully and strategically meet the interest of national sovereignty.

This research found evidence and use cases of trade secrets in the searched MD, COMAER, and Department of Aerospace Science and Technology (to which the IMC is directly linked and subordinated) documents. To comply with the regulations on defense innovation, the IMC seeks to promote strategies to promote the DIB via technology transfers to companies interested in Air Force technological assets after evaluating their capacity to absorb these technologies and protect such knowledge.

However, using these highly relevant assets requires well-structured research and development projects and mechanisms to protect such knowledge, without which such work can become fruitless or even weaken the Brazilian defense capacity.

Thus, IMC asset management criteria aim to avoid third parties from misappropriating technologies. In fact, Joseph and Poznansky (2024) concluded that institutions that research national security and keep it secret tend to be more innovative, especially if they maintain such secrecy in the first stages of research (i.e., in early technology maturity and invention conception).

Comparing the main protection strategies for technological assets of industrial defense application (namely, trade secrets and patent) shows that patents oblige inventors to disclose in detail their invention and method by which they arrived at their results. Holgersson and Aaboen (2019) find that granted patents need constant monitoring and inspection so that they can benefit from its exclusivity.

2 Available at: https://sinaer.dcta.mil.br/index.php/itmn-vitrine-inovacao/476-art-vitrine-inovacao. Access on: April 29, 2026.

This characteristic is crucial for the analysis in this study since patenting critical or strategic military technologies provides foreign countries or companies (which were yet to reach such a level of development) a way to accelerate their military development advances. Unlike patents, trade secrets involve no disclosure of the technology or processes (Searle, 2021).

Thus, protection via trade secrets holds significant importance for technologies that are difficult to reverse engineer, in line with the wide use of this type of protection by the COMAER TIC, especially regarding complex defense technologies in aerospace. According to Marinho, Pinheiro-Machado, and Galdino (2025), the Brazilian Army STI also use trade secrets to protect some of its technologies, reinforcing their understanding of the sensitivity of their technologies.

Thus, it is important to consider the framing of some aspects of IMC activities in a closed innovation environment (even if in partnership with private sector entities) due to the importance of maintaining secrecy and protecting technological assets due to the direct relationship with their application in defense and, ultimately, with the maintenance of national sovereignty. This approach contributes to Brazil reducing its low technological sovereignty, as described by Amann (2002).

Moreover, severe and persistent technological curtailment from developed countries aims to stop the advance of developing countries and maintain their strategic and commercial advantages (Longo, 2007). This curtailment occurs in various fields of knowledge, but much more intensely in military technologies.

In this scenario, trade secrets emerge as an important mechanism to balance the need for technology transfer to the national industry with the safeguarding of strategic information. The use of this protection instrument enables the IMC to maintain some control over sensitive knowledge, avoiding the risks inherent to patenting (since it requires public disclosure of technical details). Moreover, avoiding patenting technologies can somewhat reduce the curtailment associated with the supply of components or inputs necessary for its development and production.

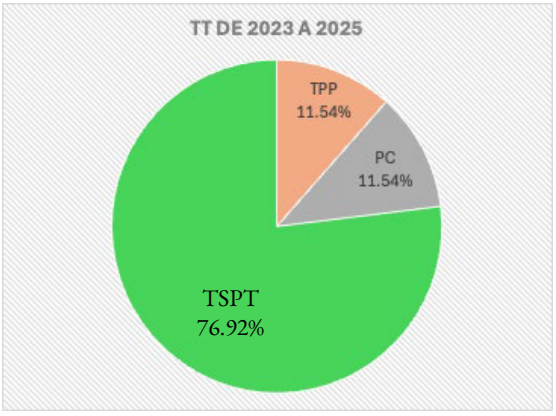
Considering the importance of trade secrets and the strategies to protect them, the IMC has increased technology transfer actions that foster DIB development.

Since its last restructuring in 2023, the IMC has adopted a much more active and dynamic stance toward the negotiation of COMAER technological assets. Thus, this study will explore some data from control and management spreadsheets of these assets regarding January 2023–June 2025.

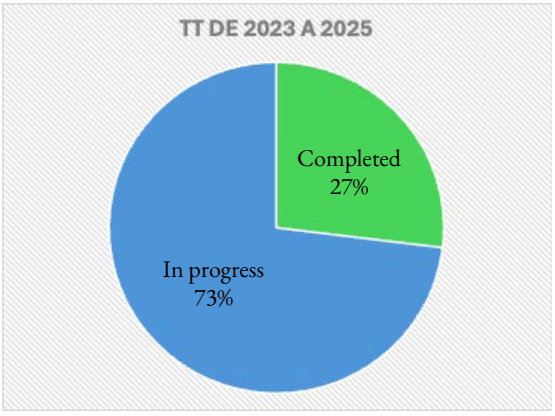
This study found that 26 technology transfer negotiations began in this period, of which three refer to patent-protected technologies; three, to computer programs; and 20, to TSPT. Note that seven of these negotiations have been concluded. The remaining 19 are under negotiation. Chart 1 shows the types of protection used in trades from January 2023 to June 2025:

Chart 1 – Technology transfers (completed or in progress) from January 2023 to June 2025

Patent-protected technology



Computer programs



Source: Prepared by the authors.

The data in Chart 1 indicate a trend toward the adoption of trade secrets as a form of knowledge protection. The normative and doctrinal guidelines in force in defense (such as the National Defense Strategy, the MD Intellectual Property Policy, and the Military Strategic Plan of the Air Force) support this fact.

Although the results, due to confidentiality, are unable to detail the motivations for each type of protection, this study found the predominance of trade secrets in IMC transfer agreements. Table 1 compares the two approaches based on the academic literature and observed institutional practices to synthesize the main characteristics, advantages, and disadvantages of each protection mechanism and understand why trade secrets have constituted a recurrent strategy for the IMC.

Table 1 – Advantages and disadvantages of patents and trade secrets for the Air Force

Characteristic	Patent-protected technology	trade secret-protected technology
Meeting the requirements of national sovereignty	**Disadvantage**: Disclosure of technology with a high level of detail or a critical technology to potential adversaries or enemies.	**Advantage**: Sole maintenance of the technology under the domain of Brazil and its strategic partners to obtain or maintain tactical or strategic advantages in military technologies.
Legal protection	**Advantage**: Strong and enforceable exclusive right against third parties, even with independent development.	**Disadvantage**: No protection against independent development or reverse engineering. Protection depends on maintaining confidentiality.
Disclosure	**Disadvantage**: Requires full public disclosure of the invention.	**Advantage**: No public disclosure is required. The information remains confidential.

Continue...

Table 1 – Continuation

Characteristic	Patent-protected technology	trade secret-protected technology
Duration of protection	**Disadvantage**: Limited (15 or 20 years from filing depending on the type of patent).	**Advantage**: Potentially unlimited as long as the secret is kept.
Initial cost	**Disadvantage**: Significant filing and processing costs (the latter greater if including other countries).	**Advantage**: No registration costs, with worldwide effects.
Procedure for granting protection	**Disadvantage**: Longer and more expensive and complex.	**Advantage**: Immediate protection as soon as secrecy measures are implemented.
Scope	**Disadvantage**: Not very broad and focused; strict requirements (novelty, inventive step, industrial application).	**Advantage**: It can protect a wider range of unpatentable information (customer lists, know-how).
Value as an asset	**Advantage**: Clear intangible asset with a public record and defined scope. **Disadvantage**: Although the holder can retain commercialization exclusivity, the dissemination of the technology can facilitate the emergence of competing solutions based on the published content.	**Advantage**: It can represent a high-value strategic asset by ensuring exclusive access to knowledge. **Disadvantage**: It can be more difficult to value and transfer than a patent as disclosing its contents for appraisal can compromise the very existence of the asset.
Defense against copy	**Advantage**: Protects against direct copying and reverse engineering.	**Disadvantage**: Vulnerable to reverse engineering, secrecy leaks, and independent development.
Territoriality	**Disadvantage**: Protection generally limited to the country of the grant. Requires separate registrations for international protection.	**Advantage**: Not inherently territorial, but legal enforcement against misappropriation can vary across jurisdictions.
Image and reputation	**Advantage**: It shows the capacity for innovation and can attract investors.	**Disadvantage**: Less publicly visible as proof of innovation.
Maintenance	**Advantage**: It requires no internal secrecy mechanisms. **Disadvantage**: Periodic maintenance fees to keep the patent valid.	**Advantage**: Lower cost than patent fees. **Disadvantage**: Continuous effort to keep information secret. Needs robust contractual instruments in cases of technology transfer.

Source: Prepared by the authors.

The criteria in this analysis served to compare the advantages and disadvantages of adopting trade secrets as opposed to patenting to protect technologies critical to national sovereignty.

In favor of TSPT, nine advantages and five disadvantages emerged regarding the evaluated characteristics. Patent-protected technologies showed five advantages and nine disadvantages. Only considering quantitative aspects would have lent secrecy a great advantage. However, this criterion is merely informative and should constitute no guide for decision-making at the IMC.

The characteristics in Table 1 have varying weight or relevance as these technologies are considered critical or potentially harmful to national security if disclosed. Following this logic, this

research finds that "meeting the requirements of national sovereignty," "disclosure," "duration of protection," and "territoriality" hold greater importance than the other characteristics as they meet the precepts in the MD and COMAER high-level regulations, which aim to protect information essential to the security of society and the State. Trade secrets offer advantages over patents regarding all these characteristics.

Patent also offers important advantages, such as "legal protection," "value as an asset," "defense against copy," and "image and reputation." These positive and strategic characteristics in the corporate and commercial environment will often hold less relevance to COMAER due to the objectives of its research, development, and innovation activities.

A hybrid strategy has proven to be the best approach for the IMC, protecting certain aspects of its technologies with patents and others as trade secrets. Bhattacharya and Guriev (2006) state that companies usually use trade secrets when the negative impact of a possible leak is high and patents when such impact is low.

The decision to protect technologies via secrecy or patenting is neither trivial nor an exclusive to IMC professionals. All technical, strategic, doctrinal, legal, commercial, and social concerns are discussed with the STI that developed the technology and with Department of Aerospace Science and Technology leaders, in line with Holgersson and Wallin (2017).

Note that SINAER greatly emphasizing trade secrets fails to prevent COMAER from transferring technologies and benefiting the Brazilian society.

COMAER uses trade secrets in a way other than that applied to large companies (i.e., to restrict knowledge to the sole benefit of these institutions) since, unlike them, COMAER seeks strategic partners to transfer such knowledge and develop the Brazilian industry, generating employment and income and maintaining these technological advantages at the sole service of Brazil.

This development and innovation model also meets the MD strategic objectives, which permanently seek development and independence in critical technologies Brazil needs to maintain its sovereignty and circumvent its technological constraint from international States, companies, and organizations.

The Brazilian scenario includes a less explored aspect. The promotion of a national culture of technological asset protection via trade secrets meets the conditions needed to establish offset compensatory agreements since the country owning a technology must protect the assets to be transferred to a beneficiary country to avoid that information falling into the public domain due to management problems.

Such compensation agreements commonly occur in international negotiations, in which buyers in high-value negotiations often demand compensation, such as some type of technology transfer. Thus, TSPT can represent great-value assets in future negotiations in which Brazil appears as an exporter.

4 CONCLUSION

This study analyzed the strategy of the Brazilian Air Force to protect technological assets, showing that the use of trade secrets constitutes a more preponderant and strategically advantageous approach than patenting, especially for defense technologies. The analysis of IMC negotiation data from January 2023 to June 2025 indicates a recurrent preference for trade secrets in cases of technology transfer to the national industry.

This research confirms that this choice is based on the need to safeguard national sovereignty, avoiding the public disclosure of sensitive technical details required by the patent system. Protecting trade secrets is directly aligned with the guidelines of the MD Intellectual Property Policy and the National Defense Strategy, which defend the non-disclosure of critical knowledge.

The results in this study suggest that the IMC policy fails to inhibit innovation or the development of the DIB, especially when analyzing the transfer of sensitive technologies. That model can transfer technology to strategic partners in a controlled manner, fostering the Brazilian industry, generating employment and income, and maintaining confidentiality about knowledge that confers strategic advantages to Brazil. The hybrid strategy, using trade secrets for critical technologies and patents for others, proves itself an effective and balanced management model that reconciles the protection of information essential to the security of the State with the promotion of technological innovation in defense.

The IMC strategy, focusing on strengthening the DIB, fosters the integration of the triple helix. Moreover, safeguarding this information before, during, and after technology transfer processes gives investors greater security regarding their investments, ensuring the sustainability of businesses and investments. Thus, the IMC role in regulating the SINAER innovation policy takes strategic relevance as it ensures the security and proper management of information related to trade secrets and contributes to the development of Brazil.

This analysis focused on the period from 2023 to 2025 to capture the most recent and structured phase of the IMC (after its consolidation). The limitations of this study include its impossibility of accessing and disclosing sensitive data on the value and impact of the traded technologies.

Based on the discussions and results in this study, further research can further the understanding of innovation management in defense. Based on the found gaps, this study suggests that future research expand this analysis to encompass the protection and technology transfer practices of the Brazilian Army and Navy. A comparative study could find synergies, optimize processes, and consolidate a unified doctrine of intellectual property management within the MD.

Another possibility would be to investigate how the processes of technological development occur in research centers of the armed forces of other countries and their strategies to protect critical technologies to find good practices to be absorbed by the technological innovation centers of the Brazilian Armed Forces.

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