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The role of strategic partnerships for the development of the Brazilian Defense Industrial Base: FX-2 and Guarani programs

El papel de las alianzas estratégicas para el desarrollo de la Base Industrial de Defensa brasileña: los programas FX-2 y Guaraní

Abstract: The National Defense Strategy (END) conveys the necessity for technological development through strategic partnerships, allowing for development and transference of sensible technology to the Brazilian Defense Industrial Base (BID). Certain advances are still unattainable to Brazil in an autonomous manner, therefore the need for the establishment of strategic partnerships, which possess deeper bilateral relations as the main objective. This work proposes to analyze two strategic Brazilian programs in progress in the scope of the Armed Forces, namely: F-X2 Project and Guarani Programs. In order to guide the analysis and achieve the objectives, the concept of Grand Strategy is used along with the Theory of Structural Power and the Neoliberal Institutionalism. Case studies are used as a methodology, to later arrive at the general conclusions on the benefits of the defense cooperation to the national BID.

Keywords: Industrial Defense Base. Strategic Partnership. Brazil.

Resumen: La Estrategia Nacional de Defensa (END) aborda la necesidad del desarrollo tecnológico por medio de alianzas estratégicas, para hacer posible el desarrollo y la transferencia de tecnología sensible a la Base Industrial de Defensa (BID) brasileña. Ciertos avances aún no pueden ser alcanzados de forma autónoma por Brasil, por lo que se hace necesario establecer alianzas estratégicas, que tienen como principal objetivo la profundización de una relación bilateral. El presente artículo se propone a analizar dos programas estratégicos brasileños en curso en el ámbito de las Fuerzas Armadas, a saber: el proyecto F-X2 y el Guaraní. Para orientar el análisis y lograr los objetivos, se adopta el concepto de Gran Estrategia, la Teoría del Poder Estructural y el Institucionalismo Neoliberal. Como metodología, se emplean estudios de caso para, posteriormente, presentar una visión general sobre los beneficios de la cooperación en defensa para la BID nacional.

Palabras clave: Base Industrial de Defensa. Alianza Estratégica. Brasil.

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1 Introduction

The formulation of a robust defense policy, based mainly on the development of the Industrial Defense Base (BID), emerges as a condition to overcome vulnerabilities, in order to guarantee autonomy and the ability to influence in a multipolar world. The BID refers to the group of State or private companies responsible for the research, development, production, distribution, and maintenance of strategic defense products (BRASIL, 2019). Thus, BID is a complex structure composed of different institutions that need to operate in a coordinated manner to produce materials and services necessary for the Armed Forces, encompassing Education and Research (educational institutions), Research and Development (R&D centers), Projects (engineering companies), Production (industrial companies), and Logistics (service companies) (AMARANTE, 2012).

Considering the BID relevance for better formulating and carrying out the defense policy in Brazil, the National Defense Strategy (END), prepared by the Brazilian government, consists of structural axes, and one of which is the reorganization of the BID through the development of new technological capabilities for civil and military use. In this context, establishing strategic partnerships that can provide development and transfer of technologies that meet the national interest becomes a fundamental instrument (BRASIL, 2012).

Although widely used in the literature, the concept of strategic partnership is still poorly defined and frequently employed in a global and imprecise manner. When dealing with the term, Vaz (1999) associates it with a privileged relationship at the bilateral level for fulfilling interests – important for the achievement of internal and/or external objectives – of the States that constitute it. In the Brazilian case, according to the author, strategic partnerships are historically built with a view to obtaining resources, inputs, and exploring opportunities that encourage national development. Blanco (2009) defines strategic partnership as the search for deepening and formalizing a bilateral relationship, with the objective of defining coordinated actions so that shared fundamental interests are achieved. Lessa (1998, p. 31, our translation) defines it as a priority political and economic bilateral relationship, which generates reciprocal effects, a selective approach, "which opens up the possibility of adaptation to the niches of opportunity and to the international constraints that appear in a conjunctural manner." Therefore, as can be seen, the concept of strategic partnership refers specifically to a bilateral relationship that involves countries willing to cooperate in favor of common projects that stimulate national development.

When discussing this concept, Grassi (2019) points out that partnerships are not restricted to one field, for example military or technological, and may involve other areas, but, in general, partnerships are established to cover some specific issues on a bilateral agenda. However, as the author highlights, partnerships initiated on a specific topic may have a spillover effect on other matters. Thus, strategic partnership "can be summed up as a synonym for a special, priority and necessary relationship" (GRASSI, 2019, p. 631, our translation), which is based on long-term bilateral relations and may involve "a wide spectrum of (political-institutional, diplomatic, economic-commercial, military, technological, social and or cultural) means" (GRASSI, 2019, p. 634, our translation). In the case of this article, the focus is the strategic partnership established by the Brazilian government with partners in the technological and military fields, reflecting the recognition that certain

advances cannot yet be achieved by Brazil autonomously. Thus, the objective of cooperation with counterparties is to seek strategic autonomy, preventing the government from investing more years of work and spending even more resources when walking alone (MELO, 2015).

Seeking to promote the development of the defense industry, the government has therefore encouraged the transfer of technology by establishment of strategic partnerships. The effectiveness of this process depends on four requirements: (1) there must be an entity that owns the technology and another entity capable of receiving it; (2) the knowledge to be transferred must be useful; (3) the methodology used must favor the absorption of knowledge; and (4) the full use of the technique employed must be guaranteed to the recipient (FEDERAÇÃO DAS INDÚSTRIAS DO ESTADO DE SÃO PAULO, 2012 apud MELO, 2015).

An example of a partnership is the Submarine Development Program (PROSUB), which aims to develop four conventional submarines (S-BR) and the nuclear submarine (SN-BR), together with the French DCNS company. This program, initiated in 2008, involves the largest international military contract entered into by Brazil, whose purpose is to make the country one of the few in the world to develop and build a submarine that uses one of the most complex technologies ever developed by mankind (ROSENDO; LIMA , 2018), increasing its deterrence capacity.

Despite all the positive impacts of PROSUB on the Brazilian BID, it is worth mentioning that a specific program alone is not sufficient to develop the national BID, requiring the State to adopt a strategic vision that broadly plans its submarine fleet strength, including the perspective of modernization and construction of other means. Recognizing the relevance of the program, but based on this principle, this article does not have PROSUB as the object of study, aiming to give greater prominence to other strategic programs developed by the other Armed Forces, in view of the vast existing literature on this Navy program.

Thus, recognizing the fundamental importance of strategic partnerships for the development of the Brazilian BID, this article aims to study two strategic projects in progress developed by the Brazilian Armed Forces, namely: F-X2 program, in partnership with Sweden, and Guarani, in partnership with Italy. The time frame is defined from the 2000s, more specifically from 2006 to date, in order to cover the formalization of these projects, addressing the technology transfer process.

Considering this scenario, the article aims to analyze the importance of strategic partnerships for the development of the Brazilian BID, specifically investigating the antecedents and development of FX-2 and Guarani programs, reflecting on lessons that can be learned from defense cooperation in terms of technological autonomy for the country. Thus, it seeks to identify which benefits can be provided by the establishment of strategic partnerships. To guide the analysis, it starts from a theoretical framework in the field of International Relations, using the Theory of Structural Power, proposed by Susan Strange (1994), and Neoliberal Institutionalism, developed by Axelrod and Keohane (1985). The analysis proposed is complemented with the concept of Grand Strategy, developed in Brazil by Celso Amorim (2012).[1]

1 This concept has different definitions for classic and contemporary authors. In this sense, the author Liddel Hart (1991), who defined the term in question as the major instrument of a State's policy, stands out. Other authors, such as Porter (2013) and Brands (2014), also elaborated their perceptions about the Grand Strategy. In this article we use the concept as implemented by the former Minister of Foreign Affairs and Defense, Celso Amorim, who applied it to the articulation of Brazilian foreign and defense policy.

The question that guides this article is: aiming at developing the Brazilian BID, what benefits can be provided by establishing strategic partnerships? It is assumed that through strategic partnerships it is possible to extract technological and economic advantages, besides fostering new jobs and technical labor and seeking autonomy in the technological plan.

To conduct this investigation, this study is based on case studies of the strategic programs mentioned above. According to George and Bennett (2005), case studies enable detailed evaluation of an event to develop or test explanations that can be generalized and applicable to other events. In this sense, the authors emphasize that the case study method can combine the analysis of isolated cases with the comparative analysis of a small number of cases, becoming a robust way to make inferences. Breuning (2007) corroborates this argument, stating that the comparison of a few cases allows a detailed analysis of similarities and differences that in a larger sample would be difficult to be identified, deepening the analytical richness of the study. The purpose of this article is – by analyzing F-X2 and Guarani programs – to understand the importance of establishing strategic partnerships for the development of the Brazilian BID, contributing to the dissemination of knowledge in the area.

In addition, it is a qualitative descriptive research. Research with this characteristic does not intend to generalize the results in a probabilistic way, and can be understood as a set of interpretative practices, which seek to describe phenomena, situations and contexts, detailing how they are and manifest (SAMPIERI; COLLADO; LUCIO, 1997). With regard to data collection, various academic works concerning the topic addressed are used as main sources, including articles, books and magazines, in addition to Brazilian government's official publications.

Besides the introduction, the article is divided into four sections. The first section concerns the theoretical perspective and the concepts that guide the analysis. The second and third sections present F-X2 and Guarani strategic programs, respectively. Finally, the last section refers to the conclusion and analysis of the results.

2 Theoretical Framework

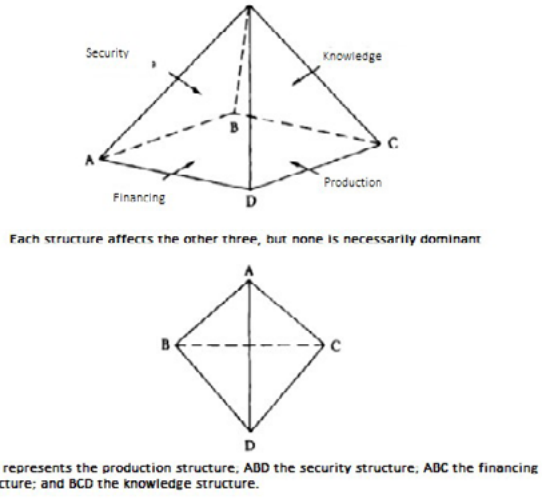
2.1 Theory of Structural Power: the four sides of the pyramid

Susan Strange (1994) considers that there are two main types of power in international relations: *Relational Power* and *Structural Power*. The former is defined as "the power of A to get to B to do something they would not otherwise do" (STRANGE, 1994, p. 24). On the other hand, the latter is the one capable of influencing others.

Strange (1994) defines four structures that compose Structural Power: *production, finance, security, and knowledge*. For the author, in general terms, all the structures of this power have in common the ability to shape and determine the direction of global economic policy, exercising control without using force.

Such structures are represented graphically by means of a four-sided pyramid, where each side represents a structure through which power is exercised in particular situations (Figure 1). It is worth mentioning that although the author has not defined a hierarchy between these structures, knowledge and security are the most important for this article, given their importance for scientific and technological development, especially with regard to the defense industry.

Figure 1 – Graphical representation of the Structural Power four-sided pyramid



Source: Strange (1994, p. 27)

The production structure is configured according to what gives health to the economy and the individuals' working condition, how they organize themselves, and what they produce (STRANGE, 1994). In other words, it is the structure that underlies almost all economic policies, since organized societies depend on production for well-being creation. There is a link between power and production: changes in the power relationship affect production, just as changes in production interfere with/change the social relations of power. This statement is confirmed by two major changes that have occurred in recent times: the rise of the capitalist model and the gradual change in production, which previously aimed at satisfying the national market, and currently seeks the global market.

The finance structure is basically based on granting and creation of credit, in addition to currency exchange (STRANGE, 1994). Credit creation is shared between governments and banks. On the other hand, the monetary system is determined by government policies and the market. In general terms, this structure refers to agreements that deal with the availability of credit and the factors that determine the terms of currency exchange. It is the product of a global system defined by domestic policies, and it is a paradox; at the same time it crosses borders, it legitimizes the national State. It is characterized by being the "driving force for the development of States in the nineteenth century" (CARPES, 2006, p. 43, our translation).

The security structure is the definition according to the realistic ideal. In general, it is a structure built around State institutions. Relations between States are of great importance for this security structure, in terms of providing stability for the world economy and, as cited by Carpes (2006), at the systemic level, it is the capacity of State actors to be the only ones able to employ the legitimate use of force.

However, the security structure is also related to military expenditures that are capable of boosting technological development, expanding positive externalities, and generating spin-off effects.[2] As evidenced by the author (STRANGE, 1987), the United States dominates the security structure due to high military expenditures, contributing to the development of new military technologies, which later can also be incorporated into the civilian environment.

Therefore, one can notice a profound relationship between security structure and knowledge structure. With regard to the knowledge structure, it is noteworthy that it should not be analyzed apart from the others, since they have mutual interactions (STRANGE, 1994). The knowledge structure determines the development of science and technology as important sources of power. Based on social values, it gives value to material resources. The consolidation of the dominant capitalist mode of production took place with the First Industrial Revolution, which has since started to value the material and, consequently, the issues promoted by science and technology (CARPES, 2006).

Knowledge is owned by a group of specific people and used as a source of influence. It is an instrument of domination, as it points "to a direction, by creating the foundations on which the rest of society will order itself" (CARPES, 2006, p. 44, our translation). It produces technological innovations, which optimize production in the global market. This occurs through the specialization of labor, invested by State and private apparatuses.

The importance of science and technology in international relations goes beyond the sense of capitalist development, as it is present in political relations between States. That said, the possession of knowledge fostered by a strong security structure and, consequently, of the technological apparatus, is understood as a resource of power and dominance. Control over the knowledge structure, therefore, is paramount for the development of the defense industry, since it concentrates power in the hands of those who hold it, without explicitly showing significant coercive influence over the others. In general, knowledge is the development of technologies, a source of dispute between States, and, above all, a source of power. Therefore, it is necessary to maintain the development of the national defense industry in the State's hands by strengthening the security structure. This guarantees the defense of national sovereignty and maintains the *status quo*, if it does not increase it. In this sense, in an international scenario in which States must guarantee their security and survival, investing in knowledge and security structures, developing sensitive technologies and the defense industry is a central element to expand the country's autonomy and its deterrent capacity in relation to the others States, strengthening its international projection.

2 Spin-off: "spillover effect or 'splash' of technological and economic results triggered by military spending in the defense sector for the civilian sector of the economy" (DAGNINO, 2008, p. 46, our translation).

2.2 Cooperation from the perspective of Neoliberal Institutionalism

There are several theories in the area of International Relations with different perspectives on cooperation. For example, the realistic aspect understands that the origin of relations between States lies in human nature, and as individuals seek their own interests and power, conflict occurs easily; therefore, community ties are easily broken by the search for advantages. In its turn, constructivism affirms that cooperation should not be explained only through the lens of political and economic interest, since it arose if related to a normative nature that reflects an ethical and human concern. On the other hand, the Marxist perspective sees cooperation as a tool for maximizing the domination of States that are at the center of the capitalist world. Such States aim to get closer to control and exploit developing countries (AYLLÓN, 2007).

According to Axelrod and Keohane (1985), authors of Neoliberal Institutionalism, cooperation is difficult to be achieved, given the political reality of the international system characterized by anarchy. However, international politics is not associated with a permanent state of war, and there is the possibility of cooperation. In this way, the authors make a distinction between the terms "cooperation" and "harmony," where the former corresponds to the total alignment of interests and the latter is related to the adjustment of behavior to achieve the complementarity of interests between the actors involved (AXELROD; KEOHANE, 1985). The idea present in these distinctions is that it is possible to cooperate even in the face of certain conflicts between the parties.

The purposes and motivations of cooperation vary, and may be mainly associated with diplomatic, developmental, commercial, and humanitarian interests. Historically, issues related to security and defense have been more influenced by anarchy compared to political and economic relations, due to the level of institutionalization presented by these two structures. As a way of understanding the successes and failures in the attempts at cooperation both in the political and economic sphere and in the security and defense sphere, it is important to address three factors: the mutuality of interests, the shadow of the future, and the number of actors (AXELROD; KEOHANE, 1985).

The *mutuality of interests* involves the actors' perceptions that lead to the definition of their own interests. The process by which such interests are pursued and preferences determined is fundamental to understand the degree of mutuality, both in the military and in the economic area, although the latter is apparently less conflictive. Although military issues involve a greater number of points of disagreement, this does not mean that this will be the scenario in all cases of defense cooperation (AXELROD; KEOHANE, 1985). It can be said that the greater the degree of mutual interest, the greater the tendency to establish lasting partnerships.

The *shadow of the future* concerns what may happen in the relationship between the actors involved in the cooperation. Its perpetuation involves expectations about the future, regularity in interactions, information about the actions of the actors and fast notification in case of change of attitude (AXELROD; KEOHANE, 1985). This aspect is closely linked to the reduction of information asymmetries.

The *number of actors* affects the governments' ability to cooperate. Reciprocity can be an effective strategy in promoting cooperation. However, when there are many actors involved, the conditions for aligning interests are difficult (AXELROD; KEOHANE, 1985). That is, the fewer actors, the easier the negotiations will be.

The barriers imposed by the assumption that States are rational and act selfishly can be overcome by bringing governments closer together, stimulated to practice reciprocity in situations of distinct conflicting and complementary interests. The condition for the success of such reciprocity starts from the idea that mutual cooperation produces better results than mistrust (AXELROD; KEOHANE, 1985).

Given the above, it is worth mentioning that decision making is strongly influenced by the perception that the actors have of their own problems, especially when it comes to the area of security. And, despite the existence of independent States that aim at maintaining sovereignty and power, it is possible to seek approximation so that mutual interests are achieved in the economic and military areas. In this way, even with the realities of an anarchic international system, beneficial forms of cooperation can be promoted, increasing the States' action capacity in the face of the challenges of international relations (AXELROD; KEOHANE, 1985).

In short, the neoliberal institutionalist dimension does not consider total harmony between the actors of cooperation to be necessary, emphasizing the constant need to adjust interests so that mutual gains are achieved. Such a view is related to the concept of strategic partnership presented in the introduction of this article, in view of the fact that it makes the fact that a bilateral relationship can be rationally deepened in the face of a scenario that imposes challenges understandable. Such partnerships aim to achieve shared or complementary goals, generating better consequences than pessimism regarding the governments' ability to cooperate.

2.3 Grand Strategy: a multifaceted policy

Celso Amorim, as defense minister, pointed out that the Grand Strategy adopted by Brazil aims to contribute to the maintenance of world peace, through the combination of foreign policy and defense policy. In this context, the objective of protecting Brazilian interests is inserted, based on diplomacy and the permanent support for defense policy, where soft power,[3] marked by beneficial cooperation with other countries in the region, or extra-regional ones, will be reinforced by hard power,[4] by deterring threats and contributing to collaboration with other countries in the military sphere (AMORIM, 2013).

In this way, it can be said that the country's Grand Strategy refers to a multifaceted policy developed from the resources available domestically and from the existing opportunities at

3 Soft power: considered a mild form of power, since it induces other actors to act in accordance with certain concepts and ideas, without the need for the use of warlike capabilities (NYE, 2002).

4 Hard power: it involves concrete actions such as coercion, induction and deterrence, most commonly associated with the military power of a given state (NYE, 2002).

the international level to defend the State's interests. As you can see, the development of a grand strategy involves the coordination of different actors and areas – diplomacy, military, development – to advance interests and guarantee the country's sovereignty.

Due to the Brazilian pacifist character, the former minister points out the difficulty in preparing the Armed Forces in the face of possible external threats. Thus, he established two axes as challenges for their improvement: i) reorganization and reorientation, and ii) organization of the National Defense Industry, observing the importance of development policy. He also mentions the END, which defines the three strategic nuclear, cybernetics and aerospace sectors where Brazil seeks to obtain technological autonomy.

In view of the above, it can be said that the concept addressed, as a strategic vision of international insertion, has an intimate relationship with foreign policy, defense and development, since it "refers to the need to use the full range of resources available for the State, and not just military resources, to maintain its security" (AMORIM, 2012, p. 133, our translation).

For the Brazilian Grand Strategy to be effective, it is necessary to strengthen a Structural Power focused on technological development, closely linked to the BID. However, such development cannot be achieved on its own, mainly due to its fiscal limitations. In this context, cooperation through strategic partnerships established with countries with sensitive technologies emerges as an alternative for progress, as it will be demonstrated by analysis of the Brazilian strategic partnerships with regard to the development of the programs presented in the following sections.

3 Brazil-Sweden partnership: the F-X2 Program

In the Brazilian case, the aeronautical industry is one of the few industries with high technological density in the country, achieving a prominent position in the international aircraft market. The leading company in the Brazilian aeronautical sector is *Empresa Brasileira de Aeronáutica S.A*. (EMBRAER), whose own history is confused with the development of the sector at the national level.

However, in the late 1990s, the Brazilian Air Force (FAB) found itself with a considerable deficit in its fighter fleet, largely due to changes in the international scenario that slowed the development of the sector. In this context of need to renew the Brazilian fleet, FX program was announced in 1997, during Fernando Henrique Cardoso government (1995-2003), as part of a broader program called *Plano Fênix*[5] (ANDRADE; LIMA, 2018). The FX program would take place in three phases: (1) receipt of offer proposals; (2) elaboration of a list of the best options in cost-benefit terms, analyzing competing companies, and (3) hiring of the company chosen. It is worth mentioning that in this period creating a project with local manufacture of a new fighter was analyzed, but it was considered unfeasible because it has very high costs and a long-term completion (BONACINA et al., 2018).

5 Plano Fênix: launched in 1996, characterized by a broad program that sought to modernize the FAB, replacing the most obsolete vectors and increasing the Force operation capacity.

In 2000, the Brazilian government announced the creation of the Program to Strengthen the Control of the Brazilian Air Space (PFCEAB), whose objective was to maintain the intention to re-equip the FAB, providing the necessary conditions to carry out an international bidding process involving the F-X program. However, the acquisition was delayed in early 2003. The then Minister of Defense of Lula government (2003-2011), José Viegas Filho, justified the postponement based on the fact that the priorities of government spending were focused on social areas, especially in the fight against hunger and social programs (ANDRADE; LIMA, 2018).

As a way to resolve the issue concerning the renewal of the Brazilian aircraft fleet, the government decided to launch the proposal for the acquisition of used aircraft, seeking an alternative solution. In 2005, the Brazilian government, faced with some possibilities, opted to buy 12 Mirage 2000-5 from France, reducing the cost of the FX project from US$ 700 million to less than US$ 171 million (ANDRADE; LIMA, 2018). However, in the same year, the government announced that said project would be canceled, arguing that it considered the F-X model unambitious and problematic in some aspects (BONACINA et al., 2018).

Between the indefiniteness of the F-X program and the announcement of the F-X2 program, the Brazilian internal context was not favorable to major military acquisitions. The Ministry of Defense was experiencing political tensions, considering that civil aviation, still linked to the body, was presenting problems related to air accidents, delays, and strikes. The crisis situation allowed the then defense minister, Nelson Jobim, to propose broad reforms for the sector, with the objective of creating a strategic plan capable of focusing on armament acquisitions that would allow the development of technologies within the scope of the Brazilian BID (ANDRADE; LIMA, 2018).

In 2006, with the intention of contributing to the modernization of the Armed Forces, President Lula announced the revitalization of the F-X program, which became F-X2, with correction to the imperfections of the previous project. Thus, the manufacturer nation would have to transfer technology to Brazil as an F-X2 requirement. This meant that, at the end of an evaluation carried out with six companies, three models that could compete were selected, namely: *Boeing F/A-18 Super Hornet*; *Dassault Rafale*; and *Saab Gripen NG* (BONACINA et al., 2018). It is worth mentioning that one of the reasons for the revitalization of the F-X program was due to the fact that it had a long execution process, being technologically out of date. Some fighters, like the *Mirage 2000* and the *Gripen C/D*, were no longer being manufactured.

In this period of reactivation of the project for re-equipping the FAB, South America was experiencing a huge increase in military expenditure and armament acquisition. The broad economic growth and the improvement of socioeconomic indicators were the main drivers for this scenario. In foreign policy, Brazil started to adopt a more assertive stance, and increased expenditure and reorganization of the defense sector returned to be part of the Brazilian government's public policy agendas.

With regard to the competition for aircraft production, it can be said that *Rafale*, the French model, had political advantage. One of the reasons for this advantage was the approach to France in the defense sector, resulting in the agreement to build conventional and nuclear submarines – the theme of the previous section – and the purchase of 50 *Eurocopter EC725* helicopters for the Armed Forces. Despite the political advantage, there was strong resistance

from the military to the choice of the French model, mainly due to the high cost and a history of contractual problems between the European country and the FAB. In short, there was some suspicion about the French willingness to fully transfer the technology used in manufacturing the *Rafale*. Even with the aforementioned dissatisfaction, the tendency towards signing an agreement with France under the F-X2 scope remained unchanged (UBIRATAN, 2014).

However, in Dilma Rousseff government (2011-2016), after analyzing the proposals, the government's preference became to be Boeing's offer, as it would allow a strategic approach with the United States. From the military point of view, the advantage of this model was characterized by operational issues. However, there was a suspicion that the US Congress would not accept arms exports or technology transfer requested in the contract. Subsequently, the espionage scandal on the Internet involving classified government documents and Brazilian state-owned companies like Petrobras, revealed by Edward Snowden, caused the Brazilian government to abandon the idea of establishing a strategic partnership with the United States (UBIRATAN, 2014).

At the end of 2013, after years of discussion about the direction of FX and F-X2 programs, the then Minister of Defense, Celso Amorim, announced that the Saab company, with its *Gripen-NG* model, had been chosen in the international competition for FAB modernization. According to the minister, the choice was based on studies and considerations on performance, technology transfer, and acquisition and maintenance costs (UBIRATAN, 2014).

On October 24, 2014, the offset contract for the acquisition of 36 *Gripen-NG* fighters – 28 units for one pilot and eight for two crew members – was entered into, with the first delivery scheduled for 2019 and the last in 2024, with a total investment estimated at R$ 13 billion. It is worth mentioning that this is the largest contract in the history of the Swedish company, and the Brazilian government will have the funds for project payment supplied through a loan from the Swedish Export Credit Corporation (SEK), Swedish export credit agency (ANDRADE; LIMA, 2018).

In 2015, about 50 Brazilian engineers and technicians went to Sweden to receive training according to their roles in the program. They were the first of more than 350 Brazilians to be involved in this intense technology transfer program until the end of the production of the fighters. The agreement entered into between Brazil and Sweden comprises the largest technology transfer agreement ever made by the European country (BRAZILIAN..., 2019). In addition to training Brazilian professionals, EMBRAER will take the lead in local aircraft manufacturing and will count on the participation of other national companies such as AEL, Akaer, Atech and SBTA. The Brazilian companies' involvement in the program enables the development of the domestic capacity to design and produce *Gripen-NG* fighters in the future, meaning an important technological leap for Brazilian industry. The 36 multi-mission fighters will be used by the FAB for activities in air defense, policing, attack, and airspace reconnaissance.

According to Saab's proposal, about 40% of the fighters, and up to 80% of their structure, will be produced in Brazil. To this end, in 2016, the Gripen Design and Development Network (GDDN) was inaugurated at the EMBRAER plant in Gavião Peixoto, in the state of São Paulo. The GDDN is considered the center of technological development of *Gripen* in Brazil and currently employs about 105 Brazilian engineers, and 280 engineers may be employed throughout the years of the program. In addition, in 2018 the facilities of *Saab Aeronáutica e Montagens* (SAM) were completed, located in the city of São Bernardo do Campo, in the state of São Paulo.

SAM will produce aerostructural segments for the Brazilian *Gripen* and, by 2020 the entire area production will be ready to start working in the production of the parts (BRAZILIAN..., 2019).

Despite the apparent Swedish intention to actually transfer technology and to internalize the production process in the Brazilian industry, it can be said that there is a disadvantage in choosing this model, since some systems present in *Gripen-NG* are from other countries, as the United States, with the possibility of an embargo, since SAAB is not the owner of the intellectual property of such systems. However, in view of the interdependence that exists in the international market, it is difficult for a company to be able to fully manufacture parts, systems, processors and other technologies that involve the production of materials with a high technological level.

Even with the issue of intellectual property and possible embargo regarding the transfer of some systems, it can be said that F-X2 program encompasses a wide debate on BID national companies' training and the consequent scientific and technological progress in Brazil. In this way, the strategic partnership with Sweden can expand defense cooperation in South America and increase the importance of the Brazilian BID for the country's foreign trade. If such expectations are realized, the Grand Strategy will be put into practice, since it will depend both on the articulation between foreign policy and defense and on the expansion of cooperation with the region (ANDRADE; LIMA, 2018).

With the development of *Gripen-NG* through a strategic partnership with Sweden, Brazil will be able to achieve the status of holder of the most advanced aircraft in Latin America. Through technology transfer and internalization of production, Brazil would become a reference in military technology, being able to export its equipment to other countries in the region (BONACINA et al., 2018). In general terms, it can be said that Brazil has been achieving its main objective through the F-X2 program, which is to modernize the fighter fleet. The offset agreement with Sweden has an important meaning for the national strategy, since it boosts the country's autonomy and international prestige (BONACINA et al., 2018).

Despite the strategic importance of the program in question for the development of the Brazilian BID, a sensitive point that can be noted in this case study is the time spent to finally decide on the models and manufacturer, and five presidential administrations were necessary to come to some conclusion. This long period of uncertainty can be attributed to complexity and different interest groups at national and international levels (SILVEIRA et al., 2018). Recently, on August 26, 2019, the first *Gripen-NG* made its maiden flight in Sweden, marking an important moment in the strategic partnership between Brazil and this country (BRAZILIAN..., 2019).

4 Brazil-Italy partnership: the Guarani Program

Since 1970, Brazil has been able to build an important tradition in the tank industry, especially through the manufacture of Urutu and Cascavel armored vehicles. Both vehicles were developed by the extinct Engesa, which for a long time has exported armored models used by

the EB (Brazilian Army) and other Armed Forces around the world. Despite the stimulus to Brazilian war material export, mainly driven by the War between Iran and Iraq (1979-1988), Engesa declared bankruptcy and ended its activities in 1993. The company's concentration in the markets of the Middle East and Africa was one of the factors responsible for its collapse, considering that the countries of these regions cut imports of large arms. As a result of Engesa bankruptcy, Brazil lost expertise in the development of armored vehicles (DIAS; SANTOS; RAMOS, 2018).

Since 1998, the Army General Staff has realized the need to create a new family of armored vehicles capable of contributing to the renovation of existing units. However, the activity of developing armored vehicles in Brazil was only resumed in 2005, when the Army Technological Center (CETex) developed a project to meet existing needs. In March 2006, through studies of technical and economic feasibility, it was concluded that new armored vehicles would be produced through the creation of the New Family of Armored On Wheels (NFBR) program, aiming to recreate the Brazilian capacity to produce armored vehicles in national territory for its Armed Forces (PINOTTI, 2018).

The NFBR program consists of two subfamilies: the Light Wheeled Multi-Task Armored Vehicle (VBMT-LR) and the Wheeled Medium Armored Personnel Carrier (VBTP-MR). The former aims at the development of an armored 4x4 multi-task vehicle. However, this project is still in the initial phase of implementation, in view of the Brazilian budgetary reality that restricts the continuity of the program. The latter, called Guarani, aims to create a base platform of armored 6x6 personnel carrier vehicle, that is, it is a vehicle designed to safely transport a group to the combat area (PINOTTI, 2018).

In the context of the implementation of part of the NFBR program, Guarani strategic program was designed to modernize the Military Cavalry Organizations and transform the Motorized Infantry into Mechanized Infantry. Such a strategic project is based on the most recent trends and current technological advances. Having the END as a premise, the project contributes to the development of new capacities, since it strengthens the Brazilian industry by obtaining dual employment technology.

After defining the project, the EB launched the process to select the company that would produce the armored vehicle jointly with the institution. The process was extensive, with the participation of several companies in the sector. However, it was decided to establish a strategic partnership with FIAT, the Italian company, which designated IVECO, its internal division. In this way, the vehicle was designed so that the parts available in the Brazilian auto parts market were used, keeping it cheap and easy to maintain, and also stimulating the national industry through technical management together with the Italian automaker. In the vehicle manufacturing process, in order to guarantee technology transfer, the EB maintains a team of three full-time engineers who compose the knowledge absorption team (PINOTTI, 2018). Thus, with the presence of engineers at the factory, Brazil is again developing its expertise lost with Engesa bankruptcy, taking note of all stages of production of the vehicle and equipment attached to it.

The logistical strategy of the program in question seeks integration with the BID through partnerships with national companies that meet operational requirements and are able to sustain the program, from its conception to the maintenance of military means. The strategic partnership with IVECO is a cooperation program in which means and costs are shared, as well as a high technological level.

Initially, the program provided for the acquisition of 2,044 VBTP-MR units, but with the budget reduction, there was a reassessment of planning, with an estimated acquisition of 1,783 armored vehicles by the year 2038. In view of the budgetary reality, it is necessary to organize activities in order to achieve the objectives. The Guarani Program magnitude requires an adequate analysis of the EB budget in view of the costs of each project that makes up the program (SANTOS, 2018).

Investments in the new VBTP-MR are justified due to their greater mobility and firepower. Thus, Guarani is able to react effectively to threats present in the national territory, making it possible to act in a wide range of environments in different Brazilian regions. This characteristic is a crucial factor for the confidence of the Brazilian Armed Forces in the vehicle.

In 2012, IVECO delivered the first Guarani to the EB for evaluation evaluated by the Army Evaluation Center, and has been approved in all aspects and employed officially since March 2013. The results of the armored model in question enabled development of new products, such as the 8x8 version with greater armored protection and a more powerful engine. This new version started to be elaborated in 2015; however, the Army Bulletin of December 1, 2017 informed its suspension for budgetary reasons (BRASIL, 2017).

The strategy of the Guarani program sought integration with existing systems in the other Armed Forces, with a view to interoperability in the transportation of VBTP-MR in C-130 and KC-390 aircraft in joint operations. This integration was present in other public bodies when Guarani units were employed in the 2014 World Cup and in the 2016 Olympic Games, strengthening Brazil's national defense system (DIAS; SANTOS; RAMOS, 2018).

The activities in the program contribute to promoting science, technology and innovation in the country. With the development of all subfamilies, Guarani will bring benefits to Brazilian society, since it contributes to extra-regional deterrence and implements an effective investment in research, development and innovation. At the same time, it incorporates new technologies from all fields of knowledge applicable to modern conflicts and to the development of the Brazilian BID (DIAS; SANTOS; RAMOS, 2018).

Although it is still too early to evaluate the results of the strategic partnership between the EB and the Italian company, the program can be considered successful, since some units are already in operation, and others are still being manufactured. Using Guarani in actions, such as those of Guarantee of Law and Order, serves to improve the material and test in real situations, showing its capabilities, limitations, possibilities and characteristics (PINOTTI, 2018).

The fact that EB owns the armored vehicle intellectual property, with a team of engineers working at the IVECO factory to ensure technology transfer plus a large number of

armored vehicles ordered means that the companies that make up the project, especially the Italian company, remain in Brazil, fulfilling the main objective of the program: to restore the production capacity of armored vehicles in the national territory. In addition, some South American and Arab countries have already shown interest in acquiring Guarani (PINOTTI, 2018).

According to General Cristino (2011), one can point out as positive points of the program: (1) the development of the national ballistic steel industrial process; (2) company established in the country capable of producing state-of-the-art armored vehicles and weapon systems; (3) lower terms and costs compared to similar programs; (4) internalization of knowledge in the country; (5) promotion of national companies, and (6) the EB commanding and controlling. It is worth mentioning that a vehicle with similar characteristics would cost 30% more in the international market and the simple acquisition abroad would not generate jobs and taxes in Brazil, nor would it contribute to improving the Brazilian BID (AMARANTE, 2013). Therefore, it is concluded that the Guarani program, through the technology transfer process from the Italian company, reinforces the Brazilian technological capacity, and it is aligned with the END.

5 Final Remarks

Faced with the challenge of overcoming vulnerabilities, in order to guarantee its sovereignty and development in a competitive international context, Brazil reshaped the look at the defense area, recognizing the importance of the issue at the national level. This recognition was translated into the END (BRASIL, 2012), having as one of the structuring axes the BID and its reorganization for the formulation of a consistent defense policy. In this context, the establishment of strategic partnerships is paramount for the country to acquire the ability to master sensitive technologies through knowledge transfer provided by this type of agreement.

Thus, this article aimed to analyze the strategic partnerships in the defense area of Brazil, in the context of the execution of F-X2 and Guarani programs, highlighting their challenges, particularities, and possibilities. The chart below (Chart 1) summarizes the analysis presented throughout the article, showing the programs, their objectives, their relationship with the Grand Strategy and how they help improve the Brazilian BID.

Chart 1 – Strategic programs

	Strategic Programs	
	FX-2	**Guarani**
Strategic Partner	Sweden	Italy
Partnership objective	Production of 36 Gripen-NG aircraft	Production of 1,783 armored vehicles
Start Year	2014	2007

continue

Table 5 – Continuation

	Strategic Programs	
	FX-2	**Guarani**
Completion Forecast	2023	2038
Relation with the Grand Strategy	Take the country to a new aerospace level	Modernization and resumption of the Brazilian capacity to produce armored vehicles nationally
Technology Transfer Forecast	Yes	Yes
Key Elements of BID Increment	Local manufacturing, participation of national companies and human training	Dual employment technology, use of national parts, knowledge absorption team and interoperability

Source: The authors (2020)

Returning to the central concepts of the work, the theory of Structural Power, developed by Strange (1994), evidenced the importance of investing in security and knowledge structures, since through them it is possible to increase the autonomy in strategic sectors and expand the capacity of international projection of the country. This theory is related to the case studies, considering that the strategic partnerships analyzed are inserted in the context of resumption of public policies aimed at the development of the national BID, based on the perception of the Brazilian deficit in operational means and military materials. In other words, the mastery of security and knowledge structures contributes to the country's capacity to control the source of power, instrumentalizing it as a necessary influencer in the progress of the national defense industry.

Through Neoliberal Institutionalism, the contributions of Axelrod and Keohane (1985) helped understand cooperation in defense, even in an anarchic international scenario.

The distinction between the terms "cooperation" and "harmony" is fundamental to the idea that strategic partnerships can be deepened based on rationality and constant adjustment of interests among the actors involved. Therefore, the strategic agreements entered into within the scope of the programs analyzed represent the ability to cooperate in defense in practice and demonstrate that the achievement of shared or complementary goals generates good results.

The application of the Grand Strategy concept is justified by its ability to connect with cooperation through an assertive foreign policy, creating an awareness focused on the importance of the capacity for deterrence, economic development, and the search for autonomy at the international level. Starting from the concept in question, the Brazilian State, as a provider of peace and domestic security, needs to develop defense mechanisms to be able to defend its individuals and, mainly, its sovereignty. Therefore, F-X2 and Guarani strategic programs represent important initiatives of the Brazilian State when trying to put into practice part of its Grand Strategy, having the relationship between diplomacy, defense and development.

Despite the still initial process of restructuring the Brazilian BID, it can be concluded that strategic partnerships assume a fundamental role in the objective of revitalizing and achieving national progress, since Brazil would not have the financial capacity and expertize to develop certain capacities autonomously.

Even with the recognition of the strategic character of the programs addressed for development of the BID, knowing how to manage knowledge is essential for the innovation process to be maintained and the results to be extended. In other words, a holistic view of the defense structure needs to be adopted, correcting distortions that involve disarticulation and fragmentation of the elements that compose it (CUNHA; AMARANTE, 2011). The real perception of innovation and of the need for interconnections between the actors involved in the process creates a supportive environment that triggers policies and actions that are increasingly efficient in generating conditions that increase productivity, competitiveness, economic growth and national development, aiming at autonomy in areas strategic for National Defense (SCHONS; PRADO FILHO; GALDINO, 2020).

Thus, it is concluded that despite the relevance of these projects, which have limitations and potential, the capabilities of the Brazilian Defense Industry must be constantly expanded and improved, guaranteeing national sovereignty and positive externalities. In this sense, studies that address Brazil's National Innovation System in a more specific way and the need to change the organizational culture, with the aim of expanding the potential for transforming investments into concrete results, are paramount, and come together with the analytical effort performed here. Additionally, the Defense Modernization Trilemma is suggested as an analytical tool to deepen the understanding of case studies, as suggested by Patrice Franko (2013). According to the author, intermediate countries that need to modernize their Armed Forces in the face of a context with budgetary limitations and technological industrial capacity, such as the case of Brazil, face the so-called Trilemma. This occurs when a country fails to harmonize economic sustainability, strategic autonomy and insertion in the global value chain. However, if we consider the cases presented, we can see that Brazil has been relatively successful in dealing with the Trilemma, diversifying global strategic partners, with a view to promoting economic sustainability and greater integration in the global value chain, without abandoning issues involving their autonomy (FRANKO, 2013). A more in-depth analysis of each case based on these variables can foster interesting conclusions.

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