

AEROSPACE INDUSTRY AND OFFSETS: THE CASE OF CONTRACTING BRAZILIAN COMPANIES

Fernando de Almeida Silva¹
Rodrigo Antônio Silveira dos Santos²

ABSTRACT

The present qualitative study aims to analyze the main conceptual, normative, procedural aspects, and the dynamics of interaction between the parties involved in the practice of compensations arising from the procurement or contracting of defense-related products and services, carried out with Brazilian companies in the aerospace sector. The research presents the normative framework and describes the dynamics of interaction between Brazilian companies, foreign subcontractors, and the Brazilian Air Force. The article details the procedures for contracting defense-related products and services within COMAER, highlighting the phases of the Aeronautical Systems and Materials Life Cycle, which include the analysis of technological transfer possibilities and the participation of the Brazilian industry using the defense offset tool. Additionally, it outlines the process related to Offset Agreements, divided into four phases: prospecting needs, design and requirements issuance, Defense Product acquisition, and execution of the Offset Agreement.

Keywords: Offsets, Procurement, Technology, Aerospace Industry, Offset Agreements.

1 Fernando de Almeida Silva holds a Master's degree in Aerospace Sciences from the Brazilian Air Force University. He is an officer of the Brazilian Air Force and is responsible for the offsets of the KC-390 Project. Contribution to the article: conceptualization and writing (original draft). Orcid.org/0000-0001-5003-061X. E-mail: fernandoaed@yahoo.com.br. Lattes: <http://lattes.cnpq.br/1201537120489964>

2 Rodrigo Antônio Silveira dos Santos holds a PhD in Production Engineering from the Federal University of Santa Catarina. He is an officer of the Brazilian Air Force and a professor in the Graduate Program in Aerospace Sciences at UNIFA. Contribution to the article: writing (analysis and editing). Orcid.org/0000-0003-1696-3090. E-mail: rsilveira01@gmail.com. Lattes: <http://lattes.cnpq.br/6159723986923220>

INTRODUCTION

The practice of defense offsets plays a significant role in the modernization and development of industrial and technological capabilities in developing countries. In Brazil, this practice has proven particularly relevant in the aeronautical sector, where the acquisition of cutting-edge technology and the strengthening of industrial capacity are imperative for maintaining national sovereignty and security.

As a late-industrializing country, Brazil faces significant challenges in achieving technological autonomy. Defense offsets emerge as a strategic alternative to mitigate this technological dependence while promoting access to advanced technologies and the development of the Defense Industrial Base (BID). Through offset agreements, Brazil seeks not only technology transfer but also the creation of jobs, workforce qualification, and the strengthening of local industrial capabilities.

In this context, it is essential to understand the regulatory and procedural aspects that govern the practice of offsets in the country. Thus, the research problem emerges as follows: how are the conceptual, regulatory, and procedural aspects, as well as the dynamics of interaction, developed in the context of offsets resulting from the procurement or contracting of defense-related products and services from Brazilian companies in the aeronautical sector?

To answer this research question, the general objective of this study is to analyze the main conceptual, regulatory, and procedural aspects, as well as the dynamics of interaction among the parties involved in the practice of offsets resulting from the procurement or contracting of defense-related products and services from Brazilian companies in the aeronautical sector.

Accordingly, three specific objectives have been established:

1 - To identify the conceptual and regulatory aspects of offset agreements in the Brazilian aerospace industry;

2 - To describe the commercial and offset interaction practices and dynamics between the contracting entity, Brazilian companies, and international suppliers;

3 - To explain the processes and practices of the Brazilian Air Force in managing and executing offset agreements.

This study is justified by the lack of academic works that explain the dynamics of offset agreements resulting from contracts with Brazilian companies. By exploring this reality through the concepts, procedures, and interaction dynamics related to offsets, this article contributes to a deeper understanding of defense offsets and their implications for Brazil's industrial and technological development.

According to Gil's (2017) classification, the present study is considered qualitative, as it seeks information that cannot be expressed in numerical form. It is also explanatory regarding its general objective, as it aims to analyze the main conceptual, regulatory, and procedural aspects and the dynamics of interaction among the parties involved in a specific phenomenon. Based on the types of research sources also described by Gil (2017), this study can be classified as both documentary and bibliographic. The documentary aspect is reflected in the analysis of documents, plans, and regulations of the Brazilian Air Force concerning the conduct of offset agreements. The bibliographic dimension is observed in the consultation of books and academic articles related to the topic.

As for data collection procedures, relevant data for this work were also gathered through field research and semi-structured interviews with individuals who held key roles in the projects studied. These individuals were selected after a rigorous analysis of their backgrounds and expertise. The fieldwork was carried out at the Coordinating Committee of the Combat Aircraft Program (COPAC) from the second half of 2022 to the first half of 2024, in cooperation with the project management teams involved in this research.

COPAC is the organization within the Brazilian Air Force Command responsible for managing the development, acquisition, and modernization projects of aeronautical materials and systems. Therefore, the research focused on Projects I-X, KC-390, F-5, and A-1M—projects managed by COPAC, which were contracted with Embraer, while the offsets were directly negotiated with foreign suppliers of equipment for these contracts.

The following section presents a brief literature review that discusses the theme of offsets based on specialized literature. Subsequently, in the third section of the article, the concepts, procedures, and interaction dynamics among the parties involved in the practice of offsets arising from the procurement or contracting of defense-related products and services from Brazilian companies in the aeronautical sector will be described.

Finally, the concluding remarks will summarize the main findings of the research based on the objectives established in this study.

LITERATURE REVIEW

Markowski and Hall (2014) state that offsets are compensatory arrangements required by importing country governments as a condition for purchasing military goods and services from exporting countries. In Brazil, these compensations may arise either from the procurement of defense-related goods and services directly from foreign companies, or from contracts with Brazilian companies that need to import equipment to fulfill agreements with public administration representatives (Brazil, 2023).

Governments often resort to offset agreements as a convenient strategy to achieve various objectives. These include justifying defense expenditures through added benefits such as technological development, improvements in the trade balance, and social gains (Hartley, 2005; Taylor, 2005). Sandler (2000) further notes that these agreements also promote local development by stimulating employment and the acquisition of advanced technologies.

Taylor (2005) emphasizes that the goals of offsets may range from acquiring new technologies and capabilities to supporting local industries, gaining access to new markets, generating export revenues, and forming strategic international alliances. Hartley (2005) adds that these agreements protect the national defense industry by preserving jobs and technologies. Petersen (2011) states that the benefits of offsets can also include enhancing the skills and capabilities of the domestic workforce, particularly within the Defense Industrial Base (DIB).

However, further study is needed on the interactions among the parties involved in offset agreements, especially those resulting from the procurement of defense-related products and services from Brazilian companies in the aeronautical sector. Although offset agreements are not considered traditional expenditure contracts, they share many similar features.

Thus, contracts in the aerospace industry are crucial for shaping interactions among stakeholders. Due to the dynamic nature of these transactions, contractual relationships often lead to tensions, where expected collaboration may give way to conflict (Cullen et al., 2005). This

reality highlights the need to draft contracts that carefully balance these two aspects, as the industry frequently faces the challenge of maintaining strategic partnerships while protecting individual interests.

There is often a disconnect between the intended collaborative relationships and the adversarial nature prescribed by formal contracts in the aerospace industry. This tension can damage contractual relationships and influence formal agreements (Cullen et al., 2005). Silva (2024), through field research, observes that offset agreements arising from contracts with Brazilian companies in the aerospace sector tend to be less collaborative, as these offsets result from subcontracting by the Brazilian company to other foreign suppliers. As a result, the interaction between the contracting entity and the foreign subcontractor occurs later in the project, is more distant, and is impacted by various factors.

Offsets in the defense sector involve a variety of often conflicting interests. Hanna, Willen, and Zuazua (2013) identify the key actors in these conflicts in offset negotiations as the purchasing government, its Armed Forces, the contracting company, and the government of the contractor's country of origin.

Purchasing governments seek offsets to acquire strategic technologies, reduce trade deficits, and strengthen their local industries (Brustolin, Oliveira, & Senna, 2016). Simultaneously, their Armed Forces aim to reduce lifecycle costs and risks associated with contracts. On the other hand, contracting companies focus on profit maximization, while the government of the contractor's country is primarily concerned with protecting strategic technologies and maintaining investments and jobs domestically (Brustolin; Oliveira; Senna, 2016).

Although collaboration is desired in the aerospace industry, it faces significant structural and cultural barriers. Initially, parties may cooperate, but technical or economic difficulties often lead to defensive postures and conflicts (Cullen et al., 2005). Shared risk management and collaborative efforts become inadequate as interests diverge, particularly under intense pressure and rising costs.

Kirchwehm (2014) points out that priority conflicts, management challenges, and stakeholder disagreements can compromise offset projects. Specifically, in agreements resulting from subcontracting by Brazilian companies to foreign partners, Silva (2024) highlights factors that both positively and negatively impact these interactions.

The discussion surrounding offsets resulting from the procurement

of defense-related products and services from Brazilian companies in the aeronautical sector presents important complexities. According to Silva (2024), the presence of different parties in the expense contracts and the offset agreements contributes to the difficulties encountered in these arrangements. Understanding the distinction between those involved in commercial contracts and those in offset agreements is essential to grasp the tensions that arise during the process. In this context, foreign companies may see the offset agreement merely as an obligation, without a genuine commitment to achieving the expected success, as there is no direct economic benefit—only the fulfillment of pending offset credits. Furthermore, the original commercial contract was signed with a Brazilian prime contractor, not directly with the government entities that will negotiate the offset obligations, adding an extra layer of complexity to the situation.

THE PRACTICE OF OFFSETS WITH BRAZILIAN COMPANIES – CONCEPTS, PRACTICES, AND INTERACTION PROCEDURES RELATED TO COMPENSATIONS ARISING FROM CONTRACTS WITH BRAZILIAN COMPANIES

In order to achieve the general objective of this study—which is to analyze the main conceptual, regulatory, procedural aspects and the dynamics of interaction among the parties involved in the practice of offsets arising from the procurement or contracting of defense-related products and services from Brazilian companies in the aeronautical sector—it is important to first present the conceptual approach to what constitutes a Brazilian company within the scope of this research.

Brazilian or National? – The Conceptual Aspect of Corporate Origin

Conceptually, attention must be paid to the terminology used on the topic, including that found in some regulations. The terms “Brazilian Company” and “National Company” may seem synonymous at first glance, but there is a subtle distinction between them, which may vary depending on context. The term “Brazilian Company” refers to a company that is registered or headquartered in Brazil. It may operate only nationally or also have international operations. The term emphasizes the origin or

nationality of the company.

The term “National Company” is broader and can be interpreted in various ways. It may refer to a company that operates across the entire territory of a specific country, regardless of ownership. For example, in the U.S., a “National Company” might be one that operates nationwide but is not necessarily American-owned. However, in some contexts, “National Company” may be used interchangeably with “Brazilian Company” to describe a company headquartered or registered in Brazil.

In its original wording, the 1988 Federal Constitution, in Article 171, made a distinction between Brazilian companies and Brazilian companies with national capital, granting specific benefits and privileges to the latter (Brazil, 1988). According to Barbosa (2011), the constitutional definition in Article 171 aimed to ensure temporary and permanent protection for certain companies considered strategic for national defense and the country’s technological development. However, in 1995, the definitions of Brazilian company and Brazilian company with national capital were removed from the Constitution, eliminating the distinction based on capital origin and promoting equal treatment for all companies (Brazil, 1995).

Overall, it is observed that, both in the literature and in the regulatory framework itself, the differentiation between the terms is not very clear, and at times, the terms are used interchangeably. ICA 360-1 (2020) uses the term “national company” (Brazil, 2020b), while the GM-MD Ordinance No. 3,990, which establishes the Defense Technological, Industrial and Commercial Compensation Policy (PComTIC Defesa), uses the term “Brazilian company” (Brazil, 2023).

Therefore, although internal Brazilian Air Force regulations use the term national company, due to the reference in the superior regulation (Brazil, 2023), this study will adopt Brazilian company to refer to business entities recognized as legal persons in Brazil.

Having clarified the terminological distinctions, the next section will address the legislation that governs the subject of offsets in Brazil.

Regulatory Support and Its Chronology

The chronological organization of the main regulatory milestones related to the topic is an interesting way to understand the relationship between various legal provisions. The journey through legislative

milestones begins with the 1988 Federal Constitution, which, in Articles 218 and 219, laid the foundation for promoting the development of science, technology, and innovation, including technology transfer (Brazil, 1988).

In 1991, the Brazilian Air Force issued Ordinance 853/GM2, establishing the Ministry of Aeronautics' Commercial, Industrial, and Technological Offset Policy, which presented the first guidelines on the subject.

Ordinance No. 747/GM2, dated September 21, 1992, approved directive DMA 360-1, which defined the commercial, industrial, and technological offset policy of the Ministry of Aeronautics for the aerospace sector (Brazil, 1992). This policy aimed to foster the national industry, establishing that import contracts exceeding US\$ 1 million should include an Offset Agreement. This agreement sought benefits in the form of co-production, technology transfer, industrial capacity building, among others.

In 2002, Normative Ordinance No. 764 from the Ministry of Defense (MoD) established that the responsibility for implementing the Policy and Guidelines on Commercial, Industrial, and Technological Offsets of the Ministry of Defense would fall to the Armed Forces Commands, in their respective areas. It also set the threshold of US\$ 5,000,000.00 for requiring offsets in defense product imports, whether in a single purchase or cumulatively with the same supplier within a twelve-month period, provided such transactions were backed by current legal provisions (Brazil, 2002).

In 2005, the Brazilian Air Force revoked Ordinance 853/GM2 of 1991 and established ICA 360-1, addressing key concepts and strategic actions related to commercial, industrial, and technological offsets in aeronautics (Brazil, 2005).

In 2006, Normative Ordinance No. 586/MD established the strategic actions for the National Defense Industry Policy (PNID), mandating the adoption of technology transfer offsets in Offset Agreements, especially those related to the defense sector (Brazil, 2006).

In 2010, Law No. 12.349 added paragraph 11 to Article 3 of Law No. 8.666 of June 21, 1993, allowing the inclusion of requirements for Commercial, Industrial, and Technological Offset measures in public procurement notices for goods, services, and works contracts by the Public Administration (Brazil, 2010). The same provision was upheld in Law No. 14.133/2021, starting from Article 26 (Brazil, 2021a).

Law No. 12.598 of 2012 established special rules for the procurement, contracting, and development of defense products and systems. It also defined key terms such as Defense Product, Offset, Offset Agreement, and Offset Plan. The law defines an offset as any practice agreed upon by the parties involved, serving as a condition for the purchase or contracting of goods, services, or technologies, aiming to generate technological, industrial, or commercial benefits as guided by the Ministry of Defense (Brazil, 2012).

In 2013, Decree No. 7.970/2013 regulated certain provisions of Law No. 12.598 of March 22, 2012, establishing special rules for the procurement, contracting, and development of defense products and systems. It also designated the Ministry of Defense as responsible for authorizing and overseeing defense product imports involving commercial, technological, or industrial offsets (Brazil, 2013).

In 2018, Normative Ordinance 61/GM-MD revoked the earlier Ordinance 764 and updated the Ministry of Defense's Policy and Guidelines on Commercial, Industrial, and Technological Offsets (PComTIC Defense), establishing that import contract negotiations for defense products conducted by the Armed Forces or bodies within the Ministry of Defense, with a net value equal to or greater than US\$ 50,000,000.00, must necessarily include an Offset Agreement (Brazil, 2018).

In 2020, the Air Force Command reissued the instruction governing the principles for negotiating technological, industrial, and commercial offset agreements in aeronautics, ICA 360-1. It made clear that it had adopted a strategy, under its management and direction authority, of seeking reciprocity from foreign suppliers of goods and services in aerospace-related procurements, aiming at the development and technological-industrial modernization of the Brazilian Aerospace Sector (Brazil, 2020b). Compared to the previous version, the 2020 document updated several terms and added a specific chapter on offsets arising from contracts with domestic companies.

In 2021, Law No. 8.666/93 was replaced by the new Public Procurement Law, Law No. 14.133/2021. The new law introduced significant changes in various areas compared to the previous legislation. However, regarding offsets, it maintained the guidelines for public procurement. According to these guidelines, contracted companies must implement commercial, industrial, and technological offset measures in favor of the Public Administration, as stated in the procurement notices for goods and

services (Brazil, 2021a).

In 2021, Ordinance GM-MD No. 3.662, dated September 2, revised the Defense Technological, Industrial, and Commercial Offset Policy (PComTIC Defense), providing clearer definitions and detailing the various types of offsets. It introduced a more strategic approach, encouraged long-term cooperation, and strengthened offset agreement management through the creation of surplus credit banks. The policy also emphasized the need for flexibility in negotiations and ensured that the acquisition of Defense Products (PRODE) aligned with national interests, promoting more robust and coordinated management among the Armed Forces Commands and other Ministry of Defense bodies (Brazil, 2021b).

In 2023, PComTIC Defense was updated once again by Ordinance GM-MD No. 3.990, dated August 3, 2023. This document is the most recent regulation applicable to the procurement and contracting of defense-related goods and services carried out by the Ministry of Defense, the Armed Forces Commands, and associated entities, whether involving imports directly or those made by Brazilian companies contracted by these bodies (Brazil, 2023).

The 2023 PComTIC Defense focuses on strengthening Brazil's defense industry, promoting technological development, and seeking autonomy. Its goals include fostering national technological, industrial, and commercial capabilities, reducing foreign dependency, and enhancing the value of defense-related products through nationalization and innovation. Additionally, it aims to insert the domestic industry into the global market by promoting high value-added products stemming from research and development and consolidating Brazil's technological base in strategic areas for national defense (Brazil, 2023).

A significant and innovative addition introduced in the 2021 version of PComTIC Defense — and retained in 2023 — was the possibility of holding contracted Brazilian companies accountable if foreign suppliers fail to fulfill offset commitments with the Public Administration. This change, outlined based on responsibilities in the bidding documents or equivalent, aims to ensure that Brazilian companies are more discerning in selecting their foreign suppliers and more effective in managing their commitments, which could result in more efficient execution of offset agreements from 2023 onward.

On the other hand, the 2023 edition brought a noteworthy aspect that formalized a previously practiced but informally handled rule

that could spark discussions in contract management. Article 16 of the regulation explicitly prohibits transferring offset costs to the commercial contract values. Although this is not a new practice in offset agreements, the formalization raises questions about the transparency of the associated costs.

As pointed out by Modesti and Azevedo (2004), Markowski and Hall (2014), and Matthews (2019), including offsets in defense contracts tends to increase product costs — even indirectly — due to the complexity of associated obligations. Thus, the formalization of the prohibition may reinforce the perception of hidden costs, especially considering that price increases are often inevitable due to the nature of offsets. Therefore, while the 2023 regulation reinforces an existing practice, the challenge remains to ensure clarity and objectivity in the contracting process, preventing indirect costs from being obscured or misunderstood.

Up to this point in the regulatory review of defense offsets, there are few differences between agreements arising from direct contracts with foreign or domestic companies. However, ICA 360-1 of 2020 introduces the first significant and specific guidance for agreements stemming from contracts with Brazilian companies. It states that procurement notices related to contracting processes involving Brazilian companies, which require the purchase of foreign material, must include offset requirements applied to the imported content. These requirements must be passed on by the respective Brazilian company to its foreign suppliers (Brazil, 2020b)

The synoptic table below summarizes the information related to the normative framework that guides, supports, and regulates Defense Offsets in Brazil:

Table 1: Synoptic Table of Legislation Related to Offsets

Quadro Sinótico de Legislações relacionadas aos <i>offsets</i>		
Ano	Norma/Legislação	Descritivo
1988	Constituição Federal de 1988	Artigos 218 e 219 - Estímulo ao desenvolvimento da ciência tecnologia e inovação, ressaltando inclusive a transferência tecnológica
1991	Portaria 853/GM2	Estabeleceu a Política de Compensação Comercial, Industrial e Tecnológica do Ministério da Aeronáutica
1992	Portaria 747/GM2	Estabeleceu a Diretriz para a Ação da Política de Compensação Comercial, Industrial e Tecnológica do Ministério da Aeronáutica.
2002	Portaria Normativa nº 764/MD	Estabeleceu que caberia aos Comandos das Forças Armadas a responsabilidade pela implementação da Política e as Diretrizes de Compensação Comercial, Industrial e Tecnológica do Ministério da Defesa, em suas respectivas áreas, além de estabelecer o parâmetro de US\$ 5.000.000,00 (cinco milhões de dólares norte-americanos) para exigência de <i>offsets</i> em importações de produtos de Defesa em compra única, ou cumulativamente com um mesmo fornecedor, num período de até doze meses

2005	ICA 360-1	Revogou a Portaria 853/GM2, de 1991, e trouxe conceitos importantes e as ações estratégicas de compensação comercial, industrial e tecnológica da aeronáutica
2006	Portaria normativa nº 586/MD	Estabeleceu as ações estratégicas para a Política Nacional da Indústria de Defesa (PNID), determinando a adoção de contrapartidas de transferências tecnológicas nos Acordos de Compensação especialmente destinados à área de Defesa
2010	Lei nº 12.349	Incluiu o §11 no art. 3º da Lei nº 8.666, de 21 de junho de 1993, permitiu a inserção, nos editais de licitação para contratos da Administração Pública, de bens, serviços e obras, de exigências de medidas de Compensação Comercial, Industrial e Tecnológica
2012	Lei nº 12.598	Estabeleceu normas especiais para as compras, as contratações e o desenvolvimento de produtos e de sistemas de Defesa, bem como definiu termos importantes como Produto de Defesa, Compensação, Acordo de Compensação e Plano de Compensação
2013	Decreto nº 7.970/2013	Regulamentou dispositivos específicos da Lei nº 12.598/2012, estabelecendo que as importações de Produtos de Defesa (PRODE) ou Sistemas de Defesa (SD), que incluíssem compensações comerciais, tecnológicas ou industriais, fossem autorizadas e monitoradas pelo Ministério da Defesa, com consulta à CMID. Caso a compensação não fosse viável, o Ministério da Defesa, consultando a CMID, poderia permitir a importação sem compensação..
2018	Portaria Normativa 61/GM-MD - Política e as Diretrizes de Compensação Comercial, Industrial e Tecnológica do Ministério da Defesa (PComTIC Defesa)	Revogou a Portaria 764, anterior, e atualizou a Política e as Diretrizes de Compensação Comercial, Industrial e Tecnológica do Ministério da Defesa (PComTIC Defesa), parametrizando, entre outras coisas, que as negociações de contratos de importação de produtos de Defesa realizadas pelas Forças Singulares e pelos órgãos que integram a estrutura do Ministério da Defesa, com valor líquido igual ou superior a US\$ 50.000.000,00.
2020	Reedição da ICA 360-1	Evidenciou que passou a adotar como estratégia, no âmbito de sua competência de direção e gestão a reciprocidade de fornecedores estrangeiros de bens e serviços para obtenções destinadas à atividade aeroespacial, com vistas ao desenvolvimento e à modernização tecnológica e industrial do Setor Aeroespacial Brasileiro
2021	Lei 14.133/2021	O Artigo 26, § 6º, da Lei 14.133 trouxe um refinamento ao disposto no artigo 3º, § 11, da Lei 8.666/93, ao permitir que editais de licitação passassem a exigir do contratado, mediante justificativa da autoridade competente, compensações comerciais, industriais, tecnológicas ou condições vantajosas de financiamento em favor de órgãos públicos ou entidades indicadas. Essa evolução textual ampliou as possibilidades de compensação e detalhou o benefício, alinhando-o às normas definidas pelo Poder Executivo federal.

2021	Portaria GM-MD nº 3.662 - Reeditou a Política de Compensação Tecnológica, Industrial e Comercial de Defesa	Em relação à versão editada em 2018, a PComTIC de 2021 trouxe algumas evoluções como a ampliação do seu escopo ao incluir explícita e formalmente a obrigatoriedade de acordos de compensação em contratos com valor líquido igual ou superior a 50 milhões de dólares, reforçando a vinculação das compensações com os interesses nacionais, além de introduzir mecanismos mais robustos de gestão e controle, como a criação de bancos de créditos excedentes de compensação, visando registrar e contabilizar créditos gerados além das obrigações pactuadas.
2023	Portaria GM-MD 3.990 - Reeditou a Política de Compensação Tecnológica, Industrial e Comercial de Defesa	Atualizou a Política e as Diretrizes de Compensação Comercial, Industrial e Tecnológica do Ministério da Defesa (PComTIC Defesa)

Source: Organized by the author

Thus, after achieving the first specific objective—identifying the conceptual and normative aspects of offset agreements in the Brazilian aerospace industry—it is crucial to closely analyze the commercial and offset dynamics that shape the scenario in question.

Commercial and Offset Dynamics

Vieira and Alvares (2018) summarize that offset contracts involve three main parties: a public administration entity (the contracting party), a foreign supplier (the contractor), and at least one national beneficiary. The first distinction between offsets resulting from the direct procurement of defense goods and services from a foreign supplier and those arising from contracts with a Brazilian company—which in turn must import to meet the demand of the contracting entity—lies in the involvement of an additional party beyond those described by Vieira and Alvares (2018): the Brazilian contractor itself.

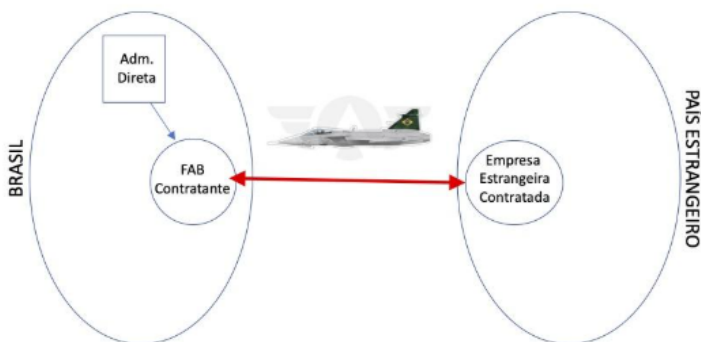
However, in the case of a public administration body such as the Brazilian Air Force (FAB), it is also necessary to consider its subordination to the Federal Direct Administration, including other ministries and oversight bodies, as well as the regulations and documentation issued by these institutions. This subordination is also an important factor in the analysis. In order to meet the second specific objective—describing the interaction dynamics between the contracting entity, Brazilian companies, and international suppliers—the use of a relationship diagram provides a

clearer illustration of the processes involved in obtaining defense-related goods and services and corresponding offsets.

In a commercial relationship between the Brazilian Air Force (contracting party) and a foreign company (contractor), there is a natural subordination of the buyer to its higher hierarchical structure—the Ministry of Defense and other related ministries responsible for budget and management oversight, which support and authorize the purchase through regulations and laws—and, on the other end, the foreign supplier itself (Figure 1).

Figure 1. Commercial Relationship with a Foreign Company

Diagrama de relações – Relação comercial com Empresa Estrangeira



Source: Figure created by the author.

As a result of the previously mentioned commercial relationship, the offset process takes place. On the Brazilian side, the illustrated Federal Direct Administration is responsible for regulation through the Policy and Guidelines for Commercial, Industrial and Technological Offset of the Ministry of Defense (PComTIC Defesa), as well as other regulatory frameworks. It also mandates the requirement of offset obligations in transactions involving defense-related goods and services exceeding 50 million U.S. dollars within one year.

In this case, the commercial relationship between the contracting entity and the foreign company is overlaid by the same connection between contractor and contractee. In other words, the established commercial relationship unfolds into an offset agreement, which involves

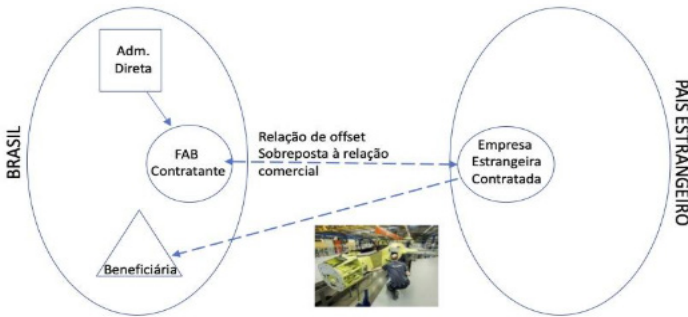
the same parties, with matching durations for validity and execution, and financial values corresponding to the generated offset credits. Thus, the contractual ties originally set for commercial procurement remain valid and are expanded to include offset obligations, strengthening the bond between the contracting entity and the contractor (Figure 2).

Furthermore, within the context of the offset, there is also the figure of the Brazilian beneficiary, the organization responsible for receiving the offset projects provided by the foreign company.

As noted by Cullen et al. (2005), there is a constant tension between cooperation and conflict in these agreements, particularly due to the differing interests of the parties involved. This underscores the need for robust contractual clauses and management strategies that help mitigate conflicts and align expectations throughout the execution of the agreement.

Figure 2. Offset with a Foreign Company

Diagrama de relações – Offset com empresa Estrangeira



Source: Figure created by the author.

The type of offset agreement analyzed in this study is the one that arises from the procurement of defense-related goods and services through a Brazilian company that needs to import materials from a foreign supplier. Still subordinated to the Federal Direct Administration, the agency responsible for acquiring these goods and services carries out the procurement in accordance with the required authorizations and oversight. In this case, the observed links are: between the Federal Direct Administration and the public administration entity carrying out the

procurement — in this example, the Brazilian Air Force, as the contracting party; the link between the contracting party and the contracted national company; and the link between the contracted national company and the subcontracted foreign supplier (Figure 3).

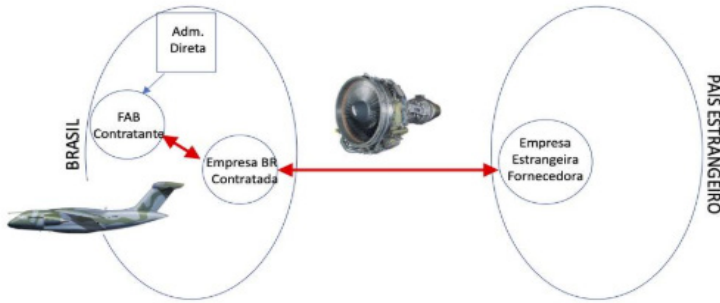
Offsets involving national companies pose an additional challenge in terms of coordination and monitoring, especially when foreign suppliers are subcontracted. This dynamic creates a network of connections between parties, requiring robust agreements to ensure that offset obligations are effectively fulfilled. Furthermore, as highlighted by Silva (2024), the subcontracting of foreign companies by Brazilian contractors can undermine the perceived commitment to national strategic objectives, as responsibilities become diluted among different actors.

This reality makes it necessary for offset agreements arising from contracts with Brazilian companies to include specific clauses that ensure joint liability between the national company and its international suppliers, thus mitigating contractual risks and ensuring the effective transfer of technology and capacity-building within the Defense Industrial Base (BID).

The requirement for holding the Brazilian company accountable is a recent innovation introduced by the 2023 edition of the PComTIC Defesa. In previous editions, this obligation did not exist, which resulted in offset agreements where the Brazilian company often acted merely as an intermediary, with little concern for ensuring the actual fulfillment of the established obligations. In practice, as observed empirically during the field study, many agreements signed before the regulatory update failed to generate concern among Brazilian companies regarding the effective fulfillment of obligations, since the responsibilities largely rested with the foreign suppliers. The change introduced by the new regulation, therefore, seeks to address these practical issues by promoting greater shared responsibility and commitment from the contracted national company.

Figure 3. Commercial Relationship with a Brazilian Company

Diagrama de relações – Relação comercial com Empresa Brasileira



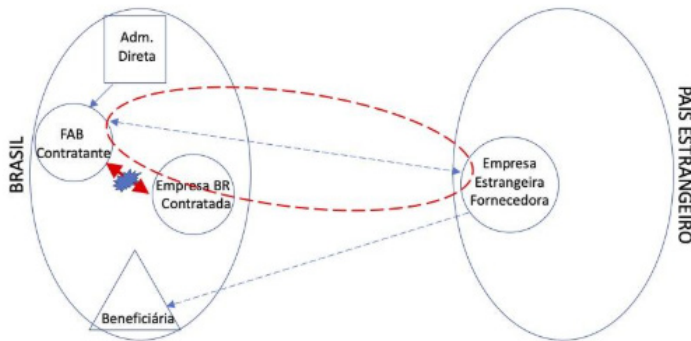
Source: Figure created by the author.

In the offset relationship that arises from the aforementioned commercial transaction — similar to the offset resulting from direct procurement from a foreign supplier — the links between the contracting party and its superior administrative structure are maintained. However, a new relationship emerges in this process: between the subcontracted foreign company and the beneficiary entity, that is, the Brazilian company or organization receiving the transferred technology.

Empirical observations conducted within the context of this research indicate that, specifically regarding offsets, the direct relationship between the contracting party and the main contractor tends to become less prominent, while a more subtle connection emerges between the foreign (subcontracted) company and the contracting entity, in this case, the Brazilian Air Force (FAB) (Figure 4). This observation reinforces Silva's (2014) finding about the additional layer of complexity introduced by this type of offset.

Figure 4. Offset Derived from Contracting with a Brazilian Company

Diagrama de relações – Offset derivado de contratação com Empresa Brasileira



Source: Figure created by the author.

Procedural Aspects – Procurement of Defense-Related Products at COMAER

Regarding the explanation of the processes and practices of the Brazilian Air Force in the management and execution of offset agreements, the procurement of defense-related goods and services by the Air Force Command generally follows the guidelines outlined in the Aeronautics Command Directive on the Life Cycle of Aeronautics Systems and Materials, DCA 400-6 (Brazil, 2007).

In summary, the life cycle of a system, equipment, or defense-related goods and services is a sequence of activities and events that must be observed to meet an operational need. In other words, it consists of a set of procedures ranging from the identification of a capability gap or operational need; the fulfillment of that need by the system; the comparison of the system with established requirements; the use of the system or equipment; its timely modernization or revitalization; and, finally, deactivation (Brazil, 2007).

The life cycle is divided into the following phases: Conception;

Feasibility; Definition; Development/Acquisition; Production; Implementation; Utilization; Revitalization, Modernization or Improvement; and Deactivation (Brazil, 2007).

In the first phase, Conception, an operational need is identified and consolidated through the issuance of Operational Requirements (ROP). This is followed by the Feasibility phase, which compiles all necessary information about the Life Cycle. It involves the first formal contact with companies or interested governments and includes the analysis of alternatives, risks, timelines, cost-benefit relations, and the strategy definition for the various activities involved in the life cycle of the analyzed material.

The Feasibility phase includes an analysis of the global market to assess the system's ability to meet the established operational requirements. It also includes initial assessments of the possibilities for technology transfer, Brazilian industry participation, and offset obligations.

The next phase, Definition, involves detailed studies of the system, including engineering analyses, modeling and simulation, nationalization objectives, and preliminary industrial development and capacity-building plans. It directly links the system acquisition to technology transfer opportunities and the development of the Defense Industrial Base. In the Definition phase, during the company selection subphase, bidders present their Offset Plans, which are later submitted to the Offset Committee via the Brazilian Air Force General Staff (EMAER). The Definition phase ends with the selection of the company or government entity for product development or procurement and the drafting of the contract (Brazil, 2007).

It is important to note that from the beginning of contact with bidders or suppliers—especially in international acquisitions of defense-related goods or services—it is determined whether offset obligations will apply, in accordance with the Defense Technological, Industrial, and Commercial Offset Policy (Brazil, 2023), or whether such obligations will be waived.

Thus, if the legal threshold of a net value equal to or greater than USD 50,000,000 (fifty million U.S. dollars), or its equivalent in another currency, is met—either in a single purchase or cumulatively from the same supplier within twelve months—the provision of offsets becomes a basic criterion for participation in the bidding process. It may even act as a barrier for companies that do not meet the requirements (Markowski

& Hall, 2014). At the same time, mandatory offset requirements not only increase the product's price but also limit the contracting entity's negotiation flexibility and ability to obtain better deals (Markowski & Hall, 2014).

Following the Feasibility phase is the Development/Acquisition phase, focused on developing or acquiring the selected system/material—or making major upgrades in the case of revitalization, modernization, or improvement. During this phase, the Nationalization and Technology Transfer Plan is implemented, as well as the Offset Plan, following the schedule established in the Offset Agreement. As noted by Hartley (2005) and Taylor (2005), the technological development phase resulting from offset agreements tends to promote the industrial modernization of the purchasing country, but also poses challenges in terms of implementation control and oversight. In this context, FAB's agreements aim to balance strategic interests with effective technology transfer (Brazil, 2007).

Although subsequent phases such as Production, Implementation, Utilization, Revitalization, and Deactivation exist, they do not directly affect the offset process. This is because, although offset agreements are linked to the main contracts through specific clauses or annexes, offset transactions may proceed at their own pace and may be largely independent of the main contracts—especially in the case of indirect offsets, where obligations are unrelated to the procured item (Silva, 2024).

However, despite this relative autonomy, there are cases where the procurement values and offset credits must follow the same timeline. Ideally, both contract durations and their execution periods should align. A practical example of this interdependence can be seen in the offset agreements related to the Brazilian Air Force's acquisition of KC-390 aircraft. In 2022, when the contract was reduced from 28 to 19 aircraft, offset credits were proportionally adjusted, demonstrating the need to align contractual values with offset obligations.

Additionally, Ordinance GM-MD No. 3.990, issued in 2023, reinforced this guidance by establishing that, whenever possible, the implementation period for offset agreements should coincide with the main contract duration. In cases where the offset agreement extends beyond the main contract's duration, justification and risk-mitigation measures must be provided, including the possibility of requiring guarantees from the foreign supplier.

Offset agreements seek to mitigate the negative economic

impacts on the trade balance of the purchasing state resulting from large acquisitions of goods or services from foreign suppliers. In general, the purchasing state seeks to offset its commercial expenditure by negotiating other commercial, industrial, or technological benefits with the supplier, flowing in the opposite direction of the financial transaction (Alvares & Vieira, 2017).

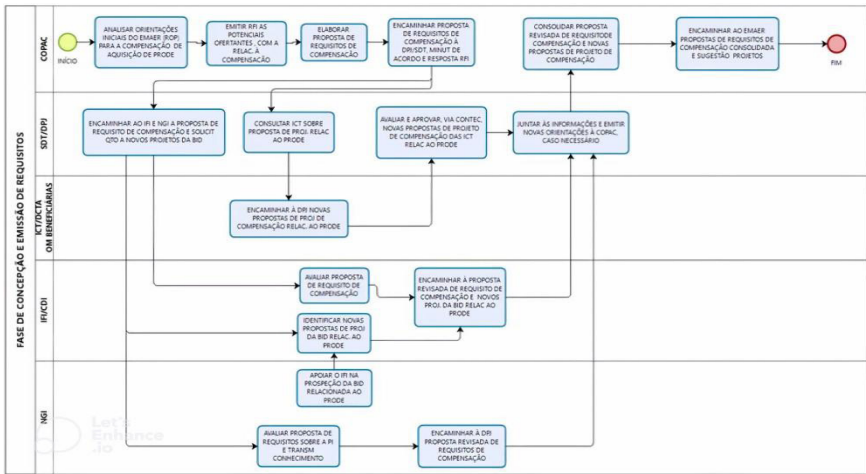
The offset agreement is an administrative contract associated with the main expenditure contract, also known as the Commercial Contract. It defines the obligations of the foreign supplier with respect to national companies and/or institutions (Brazil, 2020b). The offset process related to defense-related imports is triggered by such acquisitions and applies whenever the value exceeds USD 50 million, in a single purchase or cumulatively from the same supplier within a 12-month period (Brazil, 2023).

It is important to emphasize that offset agreements stem from defense procurement negotiations and only exist because of these contracts. However, these agreements do not involve a financial flow between the contracting party and the supplier. A monetary reference is used solely for the measurement, monitoring, and execution control of the offset projects that comprise the agreement.

The monetary reference serves only as a benchmark for the recognition and validation of Offset Credits (Brazil, 2020b). Thus, as the supplier provides evidence of fulfilling the agreed transactions, recognized Offset Credits are deducted from the supplier's outstanding offset obligations until the agreement is 100% fulfilled. Mapping the procurement process for offsets arising from defense-related imports is an important part of this study, as it allows the identification of phases and the actors involved and their respective roles.

Within the Air Force Command, the process related to offset agreements is divided into four phases: identification of needs; requirements conception and issuance; acquisition phase; and, finally, the execution of the offset agreement (Brazil, 2020a). The initial phase aims to identify a set of research, development, and innovation gaps necessary to build the capabilities required by COMAER (Brazil, 2020a).

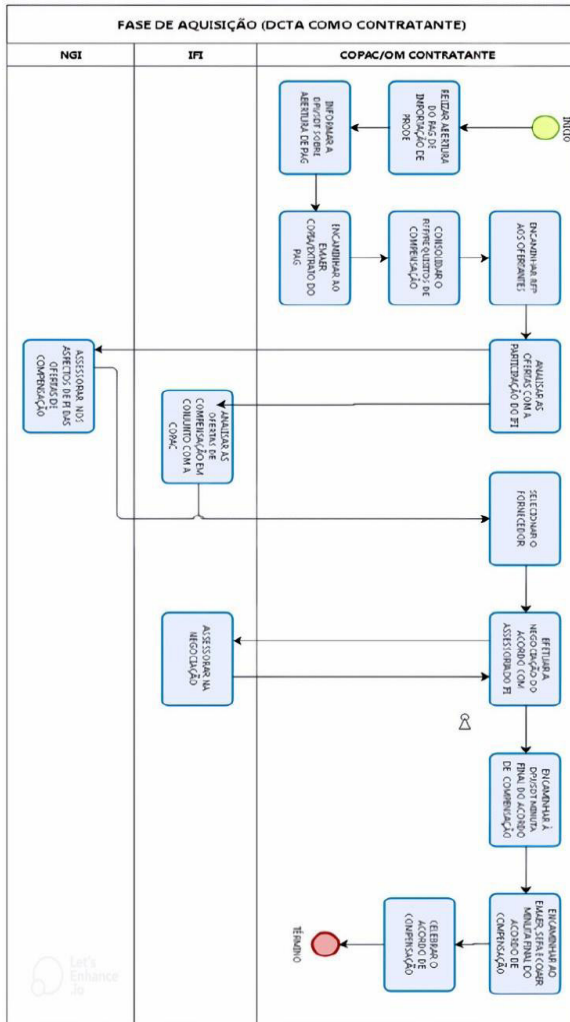
Figure 6. Conception and Requirements Issuance Phase



Source: (Brazil, 2020a)

In the subsequent stage, the acquisition phase, the proposed project selection process is executed, the Compensation Application Plan is defined, and negotiation activities are carried out, along with the signing of the resulting Compensation Agreement (Brazil, 2020a).

Figure 7. Acquisition Phase

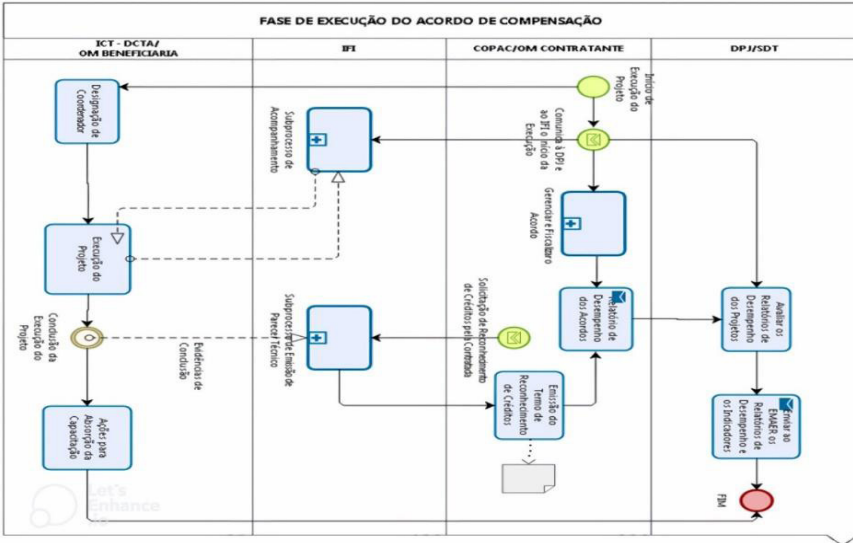


Source: (Brazil, 2020a)

In the final stage of the compensation process, the execution of the Compensation Agreement itself takes place. In this stage of the process, the FAB, through its organizations, monitors the agreement with the contracted company and the beneficiaries of the agreement until its completion (Brazil, 2020a). In this regard, Kirchwehm (2014) warns that

the management and monitoring challenges of compensations are often intensified by the complexity of contracts and the presence of multiple actors. Thus, the continuous monitoring by the FAB aims to mitigate risks of non-compliance and ensure that the established strategic objectives are achieved.

Figure 8. Execution Phase of the Compensation Agreement



Source: (Brazil, 2020a)

The phases described above are indifferent for offset agreements arising from direct contracts with foreign companies or with those Brazilian companies that need to make imports to meet the demands of the FAB. The differentiation between agreements originating from contracts with foreign companies and those from contracts with Brazilian companies goes beyond documentary records, becoming more evident in the management practices of the agreements. This distinction manifests primarily in the operational and managerial dynamics, influenced by factors such as the low bargaining power, the greater workload for the public administration, the reduced commitment of the contractors, the mismatch between the commercial contract and the offset agreement, in addition to additional difficulties in managing the agreed commitments (Silva, 2024).

CONSIDERATIONS

The understanding of the conceptual, normative, and procedural aspects related to offsets arising from contracts of defense interest with Brazilian companies in the aerospace sector was achieved through considerations on the regulatory support, commercial contracts, and offset agreements, as well as discussions on the procurement of defense-related products within the Brazilian Air Force Command (COMAER) and the compensation process. The text demonstrated that, although “Brazilian company” and “national company” are used interchangeably, the term “Brazilian company” is more appropriate for research on offsets, aligning with the Normative Ordinance No. 3,990/GM-MD of 2023.

Regarding regulatory support, the chronological legislation supporting offsets was highlighted. In terms of commercial and offset dynamics, the overlap of relationships between the parties in contracts with foreign companies was demonstrated, which does not occur with Brazilian companies, making the process more complex.

Regarding the procedural aspects of procuring products and services of defense interest at COMAER, it was shown that procurement follows what is outlined by the Brazilian Air Force Command Directive on the Life Cycle of Aeronautics Systems and Materials, DCA 400-6, a set of procedures that range from identifying the gap or detecting the operational need; meeting the need with the system; matching the system with the established requirements; utilizing the system or equipment; timely modernization or revitalization; and deactivation. Regarding the phase division of the Life Cycle, they were described as: Conception, Feasibility; Definition; Development/Purchase; Production; Implementation; Utilization; Revitalization, Modernization, or Improvement; and Deactivation.

Following this sequence, it was found that during the Feasibility phase, a market analysis occurs to assess the capacity of the analyzed system to meet the established operational requirements, as well as the preparation of initial opinions on the possibilities for technology transfer, Brazilian industry participation, and offset requirements. Continuing with the sequence, it was shown that during the Development/Purchase phase, the Nationalization and Technology Transfer Plan is executed, as well as the execution of the Compensation Plan, carried out according

to the schedule established in the Compensation Agreement, negotiated and signed with the contracted company, as part of the Development or Purchase contract.

Regarding Offset Agreements, it was demonstrated that they aim to mitigate the economic impacts on the contracting state's trade balance in the face of large purchases of goods or services involving foreign suppliers, easing the outlay in the commercial transaction by negotiating other commercial, industrial, or technological benefits with the contractor, in contrast to the flow of financial resources. In COMAER, the process is divided into four phases: prospecting, conception and issuing of requirements, acquisition, and execution of the Agreement.

It is concluded that the overall objective was achieved, allowing for the analysis of the main conceptual, normative, procedural aspects, and the dynamics of interaction between the parties involved in the practice of offsets arising from the procurement of defense-related products and services with Brazilian aerospace companies.

Despite the regulatory advances promoted by PComTIC in 2023 and the ongoing efforts of the FAB to improve the management of offset agreements, significant challenges remain in ensuring the effective transfer of technology and holding Brazilian companies accountable for the commitments made. The complexity of managing these agreements, especially when involving multiple actors and international subcontracting, requires continuous improvement of monitoring mechanisms and greater integration between defense policies and the national industry. Future studies could explore more efficient management practices and analyze specific cases to evaluate the impact of recent changes in compensation policy.

In addition to consolidating the understanding of the key conceptual, normative, and procedural aspects of defense offsets made with Brazilian aerospace companies, this work makes a significant contribution to the literature by critically and thoroughly addressing the complexities and challenges of this practice in the Brazilian context. The integrated analysis of regulatory frameworks and commercial dynamics provides relevant insights for managers and policymakers, especially in a context of increasing demand for transparency and efficiency in the management of offset agreements.

REFERENCES

ALVARES, J. G.; VIEIRA, A. L. **Acordos de compensação tecnológica: teoria e prática na experiência brasileira**. 1. ed. Rio de Janeiro: Lumen Juris, 2017.

BARBOSA, Denis Borges. A noção jurídica de “empresa brasileira” após as emendas constitucionais de 1995. **Denis Borges Barbosa Advogados**, 1996. Disponível em: <https://www.dbba.com.br/wp-content/uploads/a-noo-juridica-de-empresa-brasileira-ap-s-as-emendas-constitucionais-de-1995-1995.pdf>. Acesso em: 9 fev. 2024.

BRASIL. Ministério da Defesa Comando da Aeronáutica. **Ação da política de compensação comercial, industrial e tecnológica do Ministério da Aeronáutica – DMA 360-1**. Aprova a Diretriz para a Ação da Política de Compensação Comercial, Industrial e Tecnológica do Ministério da Aeronáutica. Brasília, 23 set. 1992. Disponível em: <https://www.sislaer.fab.mil.br/terminalcendoc/Busca/Download?codigoArquivo=31474>. Acesso em: 5 nov. 2024.

BRASIL. Ministério da Defesa Comando da Aeronáutica. **Ciclo de vida de sistemas e materiais da Aeronáutica - DCA 400-6**. Brasília, 2007. Disponível em: https://conformidade.icea.decea.mil.br/media/posts_docs/DCA_400-6_-_Ciclo_de_Vi_da_de_Sistemas_e_Materiais_da_Aeron%C3%A1utica.pdf. Acesso em: 8 out. 2024.

BRASIL. [Constituição (1988)]. **Constituição da República Federativa do Brasil de 1988**. Brasília, 1988. Disponível em: http://www.planalto.gov.br/ccivil_03/constituicao/constituicao.htm. Acesso em: 9 fev. 2024.

BRASIL. **Decreto nº 7.970/2013**. Regulamenta dispositivos da Lei nº 12.598, de 22 de março de 2012, que estabelece normas especiais para as compras, as contratações e o desenvolvimento de produtos e sistemas de defesa. Brasília, 2013. Disponível em: https://www.planalto.gov.br/ccivil_03/_ato2011-2014/2013/decreto/d7970.htm. Acesso em: 9 fev. 2024.

BRASIL. **Emenda Constitucional nº 6, de 15 de agosto de 1995.** Altera o inciso IX do art. 170, o art. 171 e o § 1º do art. 176 da Constituição Federal. Brasília, 1995. Disponível em: https://www.planalto.gov.br/ccivil_03/constituicao/Emendas/Emc/emc06.htm#art3. Acesso em: 9 fev. 2024.

BRASIL. Ministério da Defesa, Comando da Aeronáutica. **Gestão dos acordos de compensação tecnológica, industrial e comercial no Departamento de Ciência e Tecnologia Aeroespacial - ICA 360-2.** Disponível em: <https://www.sislaer.fab.mil.br/terminalcendoc/Busca/Download?codigoArquivo=4720 &tipoMidia=0>. Brasília, 2020. Acesso em: 9 fev. 2024.

BRASIL. **Lei nº 12.349, de 15 de dezembro de 2010.** Altera as Leis nº 8.666, de 21 de junho de 1993, 8.958, de 20 de dezembro de 1994, e 10.973, de 2 de dezembro de 2004; e revoga o § 1o do art. 2o da Lei no 11.273, de 6 de fevereiro de 2006. Brasília, 2010. Disponível em: https://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/l12349.htm. Acesso em: 10 fev. 2024.

BRASIL. **Lei nº 12.598, de 21 de março de 2012.** Estabelece normas especiais para as compras e desenvolvimento de sistemas de defesa. Brasília, 2012. Disponível em: <https://www2.camara.leg.br/legin/fed/lei/2012/lei-12598-21-marco-2012-612592-publi-cacaooriginal-135567-pl.html>. Acesso em: 9 fev. 2024.

BRASIL. **Lei nº 14.133, de 1 de abril de 2021.** Lei de licitações e contratos administrativos. Brasília, 2021. Disponível em: https://www.planalto.gov.br/ccivil_03/_ato2019-2022/2021/lei/l14133.htm. Acesso em: 9 fev. 2024.

BRASIL. Ministério da Defesa. **Portaria Normativa nº 3.990/GM-MD, de 3 de agosto de 2023.** Estabelece a política de compensação tecnológica, industrial e comercial de defesa - PComTIC Defesa. Brasília, 2023. Disponível em: <https://www.in.gov.br/web/dou/-/portaria-gm-md-n-3.990-de-3-de-agosto>

de-2023-50 3266530. Acesso em: 9 fev. 2024.

BRASIL. Ministério da Defesa. **Portaria Normativa nº 61/GM-MD, de 22 de outubro de 2018**. Estabelece a política de compensação tecnológica, industrial e comercial de defesa - PComTIC Defesa. Brasília, 2018. Disponível em: https://www.in.gov.br/materia/-/asset_publisher/Kujrw0TZC2Mb/content/id/46673332. Acesso em: 31 jul. 2021.

BRASIL. Ministério da Defesa. **Portaria Normativa nº 3662/GM-MD, de 2 de setembro de 2021**. Estabelece a Política de Compensação Tecnológica, Industrial e Comercial de Defesa - PComTIC Defesa. Brasília, 2021. Disponível: https://mdlegis.defesa.gov.br/norma_html/?NUM=3662&ANO=2021&SER=A. Acesso em: 31 jul. 2021.

BRASIL. Ministério da Defesa. **Portaria Normativa nº 586/MD, de 24 de abril de 2006**. Aprova as ações estratégicas para a política nacional da indústria de Defesa. Brasília, 2006. Disponível em: https://www.gov.br/defesa/pt-br/arquivos/File/legislacao/emcfa/portarias/586a_2006.pdf. Acesso em: 8 out. 2024.

BRASIL. Ministério da Defesa. **Portaria Normativa nº 764/MD, de 27 de novembro de 2002**. Aprova a política e as diretrizes de compensação comercial, industrial e tecnológica do Ministério da Defesa. Brasília, 2002. Disponível em: https://bdex.eb.mil.br/jspui/bitstream/123456789/186/1/port_norm_n0_764_md_2002_pltc_dtz_comps_cmc_indu_tecnol_md.pdf. Acesso em: 8 out. 2024.

BRUSTOLIN, V.; OLIVEIRA, C. A.; SENNA, C. J. D. Análise das práticas de offset nos contratos de defesa no Brasil. **Revista da Escola de Guerra Naval**, Rio de Janeiro, v. 22, n. 1, p. 169–196, 2016. ISSN: 1809-3191.

CULLEN, P. A.; BUTCHER, B.; HICKMAN, R.; KEAST, J. A critique of contractual relationships in the aerospace industry: Collaboration v conflict. **International Journal of Law in Context**, v. 1, n. 4, p. 397–410, 2005. ISSN: 1744-5531.

GIL, Antonio Carlos. **Como elaborar projetos de pesquisa**. 6. ed. São Paulo: Editora Atlas Ltda, 2017.

HANNA, Jim; WILLEN, Bob; ZUAZUA, Maurice. GCC Defense offset programs: the trillion-dollar opportunity. **KEARNEY**, [S.l.], 2013. Disponível em: <https://www.kearney.com/industry/aerospace-defense/article/-/insights/gcc-defense-offset-programs-the-trillion-dollar-opportunity>. Acesso em: 08 out. 2024.

HARTLEY, Keith. Offsets and the joint strike fighter in the UK and the Netherlands. In: BRAUER, Jurgen; DUNNE, J. Paul (org.). **Arms trade and economic development: theory, policy and cases in arms trade offsets**. New York: Routledge Taylor & Francis Group, p. 118–136, 2005.

KIRCHWEHM, Heinz. Why failed so often the offset part of a defence procurement deal? – A case study based examination. **Business Management and Strategy**, [s. l.], v. 5, n. 2, p. 43, 2014. ISSN: 2157-6068.

MARKOWSKI, Stefan; HALL, Peter. Mandated defence offsets: can they ever deliver? **Defense and Security Analysis**, [s. l.], v. 30, n. 2, p. 148–162, 2014. ISSN: 1475-1798.

MATTHEWS, Ron. The rise and demise of government - mandated Offset Policy. In: MATTHEWS, Ron. **The Political Economy of Defence**. Cambridge: Cambridge University Press, p. 148–168, 2019.

MODESTI, Ancelmo; AZEVEDO, Aprígio Eduardo de Moura. Offset: teoria e prática. In: **Panorama da prática do Offset no Brasil**. Brasília: Projeto Editorial/Livraria Suspensa, p. 25–53, 2004.

PETERSEN, Carol Dawn. Defense and commercial trade offsets: impacts on the U.S. industrial base raise economic and national security concerns. **Journal of Economic Issues**, [s. l.], v. 45, n. 2, p. 485–492, 2011. Disponível em: <https://www.tandfonline.com/doi/full/10.2753/JEI0021-3624450226>. Acesso em: 10 jul. 2021.

SANDLER, Todd. Arms trade, arms control, and security: collective action issues. **Defense and Peace Economics**, Londres, v. 11, n. 3, p. 533–548, 2000. Disponível em: <https://doi.org/10.1080/10430710008404964>. Acesso em: 10 jul. 2021.

SILVA, Fernando de Almeida. **A prática brasileira das compensações de defesa: o caso dos offsets decorrentes de contratos com empresas brasileiras do setor aeronáutico.** Rio de Janeiro: Universidade da Força Aérea, 2024.

TAYLOR, Travis K. Using procurement offsets as an economic development strategy. In: BRAUER, Jurgen; DUNNE, J. Paul (org.). **Arms trade and economic development: theory, policy and cases in arms trade offsets.** New York: Routledge Taylor & Francis Group, p. 34–47, 2005.

VIEIRA, André Luís; ÁLVARES, João Gabriel. Acordos de compensação tecnológica (offset). **Revista da Secretaria de Economia e Finanças do Exército**, [s. l.], p. 19–28, 2018.