

# **SOUTH-SOUTH COOPERATION AND TECHNOLOGICAL DEVELOPMENT IN DEFENSE: THE CASE OF THE MISSILE A-DARTER<sup>1</sup>**

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## **Introduction**

In the present work, from the case study of the A-Darter missile, a technology transfer project between Brazil and South Africa for its development, will seek to understand how this specific case of cooperation in the military technological development sector occurred and others, understanding their dynamics and consequences for international relations, especially for south-south cooperation. This study is considered relevant, since the technological growth of developing countries is important in unleashing the historical ties of dependence on developed countries, opening the door to independence in other technical areas, as well as the creation of common spaces for the debate of their interests and the discussion of their agendas, because technological knowledge has always been one of the factors that most influenced the international hierarchy, from the steam engine to nuclear technology.

The article is arranged in three main parts: the first search clarifies the international cooperation in defense, trying to understand what this cooperation is, as it happens, in addition to a historical resumption of this process. The second part deals with south-south cooperation and south-south cooperation in defense, pointing out the insertion of Brazil in this process. The third part presents the relation between Brazil and South Africa in coo-

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peration in defense and dealing with the A-Darter project. Finally, the article concludes by pointing out the type of technological transference, and the consequences of such knowledge for the global South; there is evidence of the hypothesis that there is a quest for independence in the technological development sector, although the sustainability of such projects requires further study. In addition, the political consequences, in addition to those of technological development, of cooperation are exposed.

For the preparation of the semi-structured interview, the Brazilian Armed Forces was contacted, which made it possible to access a retired Brazilian Army Colonel, , who provided in one of his missions a scientific contribution to the development of technology process and the management of the cooperation model employed, being a member of the Brazilian technical committee in charge of receiving the technology developed during the A-Darter project. It is also worth mentioning the dissertation of Prof. Peterson Ferreira da Silva as theoretical framework for the accomplishment of the article.

## **International Cooperation in Defense**

### *Conceptual and theoretical framework*

There are three main classical ideas to understand why states acquire armaments: the idea of action-reaction (where concern about the quantity and quality of defense equipment would be related to a similar action by opposing states). The second idea, unlike the first one, concentrates on the domestic factors to achieve such objectives, either by bureaucratic-organizational mechanisms of states, electoral factors, economic or the notion of an industrial-military complex. The last idea, however, is associated with the sight of the technological imperative, covering two main aspects, which argues that both domestic and external the modernization of military means is closely related to technological developments; and the second point that talks about the emergence of a “global military order” that foresees a relationship between rich-supplying countries and developing countries receiving military technology (Silva 2011, 34 apud Wendt and Barnett, 1993).

States, in this sense of acquiring armaments, often cooperate to develop military technology. “Co-operation in defense consists in the coordination and reciprocal adjustment of the policies of States against the threats, use and control of force in inter-state relations” (Caixeta and Suyama 2016, 09) and

is often related to military cooperation, “which constitutes in an exchange between armed forces of information and experiences in the field of defense” (Caixeta and Suyama 2016, apud Abdul-hak 2013, 25-6). One possible way of thinking about military technology is to see it within a larger context of the scientific-technological historical development of mankind (Buzan and Herring 1998, 20). For the authors, therefore, it is necessary not to dissociate military technology from a larger context of technological development that would make civilian and military technologies always in constant dialogue. In his book written with Lene Hansen, Barry Buzan explains that even potential technological development interferes in strategic relationships (Hansen and Buzan, 53) and, as an example of how one technology can overflow the other. Thus, the process of international cooperation results in a sharing of technologies that can serve the states for the development of civil technologies that are in their own interest, boosting national research and industry.

### *Evolution and dividends of defense cooperation*

International cooperation has always been a European specialty, having its origins in the League of Delos (478 BC - 338 BC), an organization created to facilitate military cooperation between Greek city-states (Herz and Hoffmann 2004, 31), with Europe taking the front in this type of relationship; and with cooperation in defense products would not be different.

Since the 1960s, Western European countries have attempted to cooperate in the production of defense products, especially since they wanted to show that they were still able to maintain a certain level of military industrial capacity over the hegemony of the United States and the Soviet Union (Silva 2011, 51). The reasons why European countries cooperate are diverse, and are very similar to the reasons why other countries cooperate. Since, first, reducing costs, how they will be divided, allows countries to acquire more advanced and more expensive technologies. “For example, while the Rafaele<sup>4</sup> national aircraft program was cheaper than the Eurofighter four-country project in development costs, the price of the Eurofighter unit is cheaper than that of the Rafaele unit.” (Darnis et al. 2007, 12). Common equipment also allows one to have mutual support in international missions. Governments participating in such projects gain mutual benefits and support the maintenance of the European defense industry. In addition, such projects the exchange of information and technology, which is great for the development of states as units.

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4 Bomber fighter manufactured by the French company Dassault, has arsenal air-air and air-land. It was built to replace the SEPECAT Jaguar of the French Air Force.

Joint plans between European countries start with the production of aircraft, such as SEPECAT Jaguar, joint project France and United Kingdom (1966-1973) and ADV Tornado, a project between the United Kingdom, Italy and Germany (at the time RFA) of 1968 to 1979. From 1983 to 2003 the Eurofighter Typhoon project was launched between the United Kingdom, Germany, Italy and Spain, which is considered one of the three leading programmes in the segment, together with the French Rafaele and the Swedish Gripen<sup>5</sup> (DARNIS et al 2007, 19). The three combat aircraft, however, did not have the demand and did not collect as much as the Joint-Stricke-Fighter (JSF), aircraft developed by nine countries (England, Italy, Netherlands, Turkey, Canada, Australia, Norway and Denmark) under the US leadership: in 2005 the three European planes (Eurofighter Typhoon, Rafaele and Gripen) totaled 1,118 units in final production and the cost of each unit amounted to 29.93 billion euros, while the JSF with 3,000 units in final production estimated an approximate value of 31 billion euros in the sum of the units, thus being a strong competitor for Europe (DARNIS et al 2007, 19). It is worth remembering that the USA and Europe are the two major axes in the international defense products market and, according to SIPRI (2010, 14) data in 2010, the USA (30%) along with 4 other European countries (Russia with 23%, Germany with 11%, France with 8% and England with 4%) accounted for 76% of global transfers of conventional arms systems (Silva 2011, 53).

Thus, there are three basic ways of acquiring military technology: (1) autonomous development, (2) international cooperative development, and (3) technology transfer.

International cooperative development can be governmental or private. In this type of relation the means and the costs of development are shared, "It is a joint work in which the percentage of investment defines the percentage of ownership of the technology" (Amarante 2013, 25). Therefore, as the project objective is to reduce costs, more expensive programs may include more employees. Although international cooperation projects are aimed at reducing profits, technology transfer is one of the consequences of joint projects between two or more countries, especially because they need to be at a more or less common level of development to cooperate.

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5 The Saab JAS 39 Gripen, or F-39 Gripen is a project developed by the company Saab, in 1980. Being a single engine with the characteristic of being light. Later Brazil and Sweden developed a partnership for Gripen to be developed in Brazil, which recently acquired the system.

An important condition for the success or failure of the enterprise is the technological level in which the partners are. Cooperation is difficult when the two countries are at asymmetric levels of technological knowledge, as the strong country will seek to attract the results obtained, to the detriment of the weaker, who will have difficulties in achieving the technological objective. In the case of technological asymmetry, there is also a risk of misconduct for both partners. On the one hand, the high level partner can hinder the necessary transfer of technology to the lower level. On the other hand, the weak partner may look at the technology prepared by the strong partner as an unattainable goal. In short, a great asymmetry in technological capacity compromises partnership (Amarante 2013, 25).

The transfer of technology is the sharing of technical or scientific knowledge together with the factors of production (TCU 2014, 15) and can take several forms, such as: training, research, technical assistance, etc. Of note is the concept of off set in this type of transfer, this being any compensatory practice agreed between the parties, as a condition for the importation of goods, services and technology, with the intention of generating industrial, technological and commercial benefits. These benefits may be realized in the form of: a) co-production; b) production under license; c) subcontracted production; d) financial investment in industrial and technological training; e) technology transfer; f) obtaining materials and auxiliary means of instruction; g) training of human resources; and h) trade consideration<sup>6</sup>. Thus, when countries with common interests cooperate, they strengthen the domestic and regional industry, as they develop more elaborate projects, share expenses and learn from each other, and establish bonds of trust among themselves that may serve in the future for mutual support in other areas.

## South-South Cooperation and the insertion of Brazil

Among the definitions of “what is South-South cooperation” are two (Gisela 2010, 06): the first is closely related to a macro scope and, in itself, the second definition, “South-South Cooperation or cooperation between peripheral countries as essentially political cooperation aimed at strengthening bilateral relations and / or forming coalitions in multilateral forums, to gain greater bargaining power. It is based on the assumption that it is possible to create a cooperative awareness that allows the countries of the South to face the common problems, by strengthening their capacity to nego-

<sup>6</sup> Ordinance No. 764 / MD, of December 27, 2002. Annex II (Concepts)

tiate with the North and to acquire greater international maneuvering, by its very nature, requires common basic assumptions” (Lechini 2010, 38). The second definition focuses on this cooperation in the following dimensions: the technique; and economic, the first referring to processes where countries acquire both individual and collective capacities, through exchanges of knowledge, resources and technological know-how; while economic cooperation refers basically to cooperative relations in trade and finance (Ibero-American General Secretariat 2008, 16). Thus, South-South Cooperation is important since it guarantees the countries of the global South a certain autonomy in relation to the countries of the North, allowing, through mutual support and exchange of knowledge, to be able to wider international context. In this conjuncture of South-South cooperation and with the end of the bipolar order in the period of the Cold War, a political world began in which the regional powers began to assume great relevance, and the historical and political relation of these countries, began to bear fruit for cooperation projects, as is the case of Brazil and South Africa. Before the arrival of the Portuguese to Brazil the Portuguese arrived in Africa. The history of the Brazil-Africa relationship does not exist without the Portuguese. “Brazil and Africa, through the Portuguese maritime-commercial empire, constituted a civilizational unit” (Visentini 2016, 01) in 1415 the Portuguese arrived in Ceuta, in the north of the African continent beginning the Portuguese expansion through the Atlantic. Among the main conquests of the Lusitanians on the continent were Guinea, present-day Benin (from where they had their largest supply of slaves), Angola and Mozambique, countries of which the largest number of slaves came to Brazil.

Relations between Africa and Brazil were an integral part of the Old Colonial System, and most of it occurred within the Portuguese Maritime Empire. Brazil began to integrate the world economy, formed from the sixteenth century, when interoceanic commercial networks began to be established, in a peripheral position. [...] The economy of colonial Brazil was based on three great pillars – external dependence, latifundium and slavery. (Visentini 2016, 06)

“The three great cycles of economic prosperity that marked Brazil since 1500 were, at least at some point, based on the workforce of African origin. ... The slave trade and the sugar plantation formed the basis of the common history of the two of the South Atlantic” (ibid., N. 13). Slave ships did not only transport slaves, they also served as mail and embassy in Brazil-Africa relations. (Ibid., 07) “Trafficking economically allowed the maintenance of warehouses and bases on the African coast, effectively articulating a world

maritime empire” (ibid., 06). And it was not only the Brazilians who had perceptions about the other side of the Atlantic, those who arrived brought news of the native lands, and the sailors who came to Africa arrived with news from Brazil. According to Alberto da Costa e Silva (1994), in Angola, the events of 1822 had an enormous impact, generating a current favorable to the separation of Portugal and the union with Brazil. Along with the news came American plants, firearms and, little by little, the transatlantic market became as or more important than the old Transarian trades (Costa e Silva 1994, 24).

The years of European colonialism in Africa were decisive for a period of relative rupture in Brazil-Africa relations since Europeans did not allow African migration out of their empires. Thus, even with a large part of the Brazilian people being a direct or indirect descendant of this process, there were years of estrangement from Africa that were resumed again with the government of Jânio Quadros and intensified from the Lula government, which strengthened ties with the continent with the development of an “active, affirmative and purposeful” diplomacy.

A strategic vision and a coherent perspective grounded the new bases of Brazil-Africa relations, becoming the main focus of the so-called “South-South Cooperation” (Visentini 2016, 76). The relationship with the continent in this period went beyond diplomatic and commercial issues, reaching out to the people (on both sides of the Atlantic) initiatives to deepen reciprocal knowledge. In Brazil, several actions were taken to integrate Afro-descendants and their cultures into Brazilian society.

With South-South cooperation central to the government’s PEX, the African continent was only behind South America as a Brazilian area of influence (since Brazil is a regional power). “The strategic and economic pillars of this recent rapprochement are more important: although the continent of Africa presents marked levels of poverty, there is no stagnation in the region, which provides an important role for the Brazilian world projection” (Ibid., 77).

Thus, “Among the main emerging countries, Brazil rises as a South American regional power, a position that was defended, above all, through the universalist guidelines of foreign policy, adopted with greater effort from 2003, with the government of President Luis Inácio Lula da Silva (2003-2010)” (Asuncion 2013, 71), whose foreign policy was focused on strengthening the country’s international projection, assuring the role of regional power to guarantee greater autonomy and sovereignty. In order for this regio-

nal leadership to exist, the country started to support and promote multi and bilateral cooperation arrangements.

To this end, the diplomatic strategy used was marked by the strengthening of international cooperation, ensuring old alliances and establishing new political and economic partners, especially those with a perspective of joint action in international organizations. The establishment of such relations guaranteed the country a more solid and active position in the emerging international order (Asunción 2011, 72).

The IBSA represents an institutionalization of South-South Cooperation, which facilitates and deepens the relationship of these countries in different areas. The mechanism was a strategic initiative for political coordination of the three member states, aiming at ensuring leadership in their respective areas of influence and gaining greater space in the international arena (Asunción 2011, 78).

“The India, Brazil and South Africa Dialogue Forum (IBSA) was founded in Brasilia in 2003 with the aim of establishing a coordination mechanism among the three emerging countries, which share the characteristic of being multiethnic and multicultural democracies” (Ministry of Defense<sup>7</sup>), thus uniting common (emerging) identities with the need to expose their ideas and interests. Three aspects are related to the novelty of the partnership: the consensus of developing countries, the terminology of international cooperation, the meeting of countries with democratic regimes and the exemplification of an interstate coalition between regional powers (Lima and Hirst 2009, 09).

Among the main objectives of the Forum are, according to the MD, the union of voices in global issues and the deepening of their mutual relationship in diverse areas, contributing to a new international architecture, the diplomatic aspect unites the technical cooperation in areas of which defense stand out. That is why IBAS is so important for the A-Darter project). The IBSA allows a greater possibility of bargaining for Brazil in multilateral agendas, since it allows it to deal with issues of its interest in an international agenda (Jardim 2014, 20).

In this way, the IBSA forum was essential for South-South cooperation in defense, as it opened the door to dialogues that resulted in concrete projects, such as Brazil-South Africa. These dialogues around the issue of

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7 Available at <<https://www.defesa.gov.br/relacoes-internacionais/forums-internacionais/ibas-india-brasil-e-africa-do-sul>> Accessed on 08/14/2018



defense and security do not but also in the strategic defense of the region, with 90% of activities related to technical cooperation consisting of military training (Caixeta and Suyama 2016, 12).

Among the topics discussed [in the WG's Defense] are S & T events of interest to Defense, production of defense equipment, peace operations and exchanges of information and experiences on piracy, counterterrorism, cyber security, joint employment doctrine, structures of Command and Control (C<sup>2</sup>) and joint purchase of defense products. The most visible developments in military cooperation so far are the IBSAMAR<sup>8</sup> naval drills and the joint bilateral A-Darter development between Brazil and South Africa. (Silva 2011, 76)

In terms of cooperation in defense industry, in addition to the A-Darter project, Brazil participated in other international cooperative development projects such as the AMX (Brazil-Italy) of the aeronautical sector and the Gaúcho (Brazil-Argentina) of the terrestrial sector. In a South-South focus, the Gaúcho project stands out because it is a cooperation in terms of Brazil and South America, which is very important for Brazil and, according to the South American Defense Council, seeks to stimulate the integration of South America, fostering regional military cooperation and the integration of defense industrial bases towards the construction of the South American unit; and to prepare the Armed Forces to assume increasing responsibilities in peacekeeping operations under the guidance of the United Nations or in support of initiatives by multilateral agencies in the region (END, 2008).

With regard to the BRICS countries, and the ASA (South American-Africa Summit), in addition to the IBSA, the White Paper on National Defense (2012) highlights some bilateral agreements that Brazil is a part of, besides A-Darter. It is worth mentioning the cooperation in the space area with Russia, the China-Brazil Earth Resources Satellite (CBERS) program with China, and the Brazilian company Aeronautical (EMBRAER) 145 aircraft equipped with an Indian radar, an embryo for future cooperation with India in the area of defense (BRAZIL, 2012).

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8 An acronym for Brazil, India and South Africa, constituting a series of naval exercises among the navies of these countries.

Regardless of the type of cooperation Brazil has with other countries in the areas of defense and security, it is recognized that at the same time that these relations meet Brazilian national strategies and interests, they also collaborate in the development of friendly nations in Brazil. This is because there are many projects that promote structural changes in partner countries through institutional strengthening, training of their military and police personnel in Brazilian institutions, from systems, tactics and intelligence developed for the national level, but which are currently being shared with other countries based on the demands presented to Brazil as part of the South-South technical cooperation initiatives. (Caixeta and Suyama 2016, 09)

## **Brazil-South Africa cooperation and the case of the A-Darter missile**

### *Reasons for cooperation for the development of the project*

It was from 1964 that the Brazilian governments began to worry more about the IDB of the country, and during the years of “economic miracle” the consolidation of our industrial base took place. “Throughout the 1970s and early 1980s the industrial defense industry expanded and diversified thanks to the growing demand for defense products” (Melo 2015, 142), it is during this period of boom of the Brazilian defense industry which companies such as Avibras Indústria Aeroespacial SA (which later participates in the A-Darter project) are created with a national incentive to consolidate companies of this type in the private or mixed sector. As stated by Regiane de Melo (2015) there was a perception that the development of such companies was possible thanks to national economic growth and the existence of a basic industrial structure. At this stage, Brazil saw the export of defense products as an “instrument of foreign policy and affirmation and defense of national sovereignty” (Melo 2015, 143). Thus, during the 1980s Brazil was among the ten largest exporters of defense products, being an exporter of medium and low technology products.

The Brazilian IDB suffered in the following years until the mid-2000s a drastic change in its trajectory. This is due to three main factors: reduction of domestic and international demand for defense products, lack of a long-term defense policy and deficiencies in the productive structure (Ibid., 146).

The IDB returned to national policy in 2005 with the launch of the National Defense Policy that reconciled National Defense and industrial development with the objective of strengthening the defense industrial base through actions that sought to progressively reduce external dependence (Ibid,147).

The South African Defense Industrial Base began to worry about establishing itself autonomously after 1963 with the UN voluntary embargo because of the international community's disapproval of the apartheid regime that lived in South Africa. In 1968 ARMSCOR (Armaments Development and Production Corporation) was established in the country, a state arms development and production corporation whose function was to manage all state armaments factories, to create and expand facilities and to manage the entire external arms flow, that is to say, import and export (Ambros 2017, 123 apud Dunne 2006). Thanks to ARMSCOR in the 1980s, South Africa already had a substantial defense industry, and was effectively self-sufficient in armament production. ARMSCOR became the central player in South Africa's defense industry, as the country's procurement agency determined the size, structure, profitability and many other aspects of the local defense market, and functioned simultaneously as one of the largest armaments producing companies, with many private companies acting as their subcontractors (Ambros 2017, 123). According to Botha (2003), the private sector provided more or less half of the equipment needed by SADF (South Africa Defense Force), making the industry capable of producing most of SADF's requirements.

In the 1980s the South African defense industry suffered a dubious movement: on the one hand, due to the country's participation in regional wars such as Angola and Namibia, there was an expansion of the defense industry (Ambros 2017, 123), on the other side, suffered the consequences of the embargo. Despite this there was intensive state investment in ARMSCOR.

With the presidential elections of 1994 and the end of apartheid, a new era begins in the South African IDB: the industry was now much smaller and had lost capacity and competence but gradually it was shaping itself and becoming a more competitive actor in the international arms scene (Botha 2003, 02). With the end of the Cold War there was a consequent reduction in defense spending, which made South Africa defend itself by producing civilian products; thanks to reactions to this type of product, ARMSCOR is transferred to another government corporation, Denel (which would later participate in the A-Darter missile project). So the year 1994 puts the country in a different perspective on the world stage, being readmitted by the inter-

national community, and in the case of its defense industry was no different. The country can become a competitor in the market together with other countries. The SANDF (South African National Defense Force) emphasis is primarily on a defensive role, but also takes on responsibility for peacekeeping commitments on the continent (Botha 2003, 06).

### *Cooperation dynamics*

Air-to-air missiles are classified into two types: medium or short range (the latter being usually guided by infrared waves, in the case of A-Darter). These missiles, guided by infrared waves, are classified in generations as follows:

(1th) the pioneer missiles, which emerged immediately after World War II; (2th) those that only allow, roughly, engagements in combat behind the target; (3th) those whose engagement may be made under any aspect / quadrant of the enemy aircraft; (4th) the envelope-off-boresight capability<sup>9</sup>, being able to reach 180° off the pilot by virtue of its more accurate sensors, besides hindering its detection by the target; and finally (5th) those with 360° firing capability due to the high sensitivity of their sensors, which form images of the enemy aircraft and are considered immune to the current flares. (Silva 2011, 105)

The A-Darter is a short-range missile, designed to target air targets up to 12 km. The equipment has components manufactured in South Africa and Brazil, with extensive technological transfer and integration between the industries of both countries. The Brazilian participation in the project involves the companies Avibrás, Mectron and Opto. For the South African part, the responsibility is of the Denel company – state that responds by the main projects of defense of the country (MINISTRY OF THE DEFENSE<sup>10</sup>) “A-Darter is an air-to-air missile system SRAAM of generation of infrared images (IIR). It has a post-launch locking and memory tracing with the latest processing capabilities. The A-Darter can be assigned to a target using aircraft radar, helmet vision or the very effective stand-alone missile feature if radar silence is required. The large viewing angles and the agility of the fuselage enable shots called high visibility helmets. Long-range traps beyond the infra-

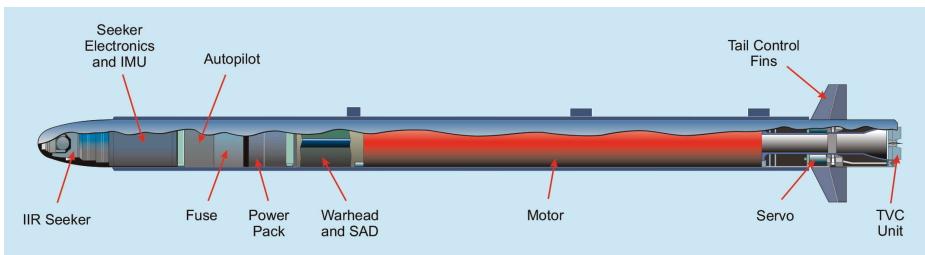
9 Off-boresight capability (off the boresight axis, longitudinal axis of the missile). It deals with the capability, therefore, of launchings out of the direction of the “nose” of the missile, at different angles of the frontal relation.

10 Available in <<https://www.defesa.gov.br/noticias/8406-pare-brasil-e-africa-do-sul-fortalecem-cooperacao-na-area-de-defesa>> Access 08/15/2018

red detection range are also possible with the lock after the A-Darter launch capability. Its length is 2,980 mm, and it is 166 mm in diameter, weighing 93 kg” (Denel Dynamics, 02).

As fifth-generation weaponry, A-Darter technology is the most internationally advanced in terms of air-to-air missiles (BRICS POLICY CENTER 2013.07). In general, it is expected that the operational performance of the Brazil-South Africa partnership missile will be similar to the other fifth-generation missiles, that is, that it has basically high maneuverability, a 360° envelope and immunity to the existing flares. (Silva 2011, 167).

**Figure 1: Structure of the A-Darter missile**



**Fonte:** Denel Dynamics [<http://admin.denel.co.za/uploads//A-Darter.pdf>] access in 13/08/2018

Funded in Brazil by the Ministry of Science, Technology, Innovation and Communications through the Financier of Studies and Projects (FINEP), the A-Darter project is driven by the rapprochement between Brazil and Africa, especially South Africa. The IBSA forum on May 31 and June 5, 2003 was the crucial event for the project's tip. As stated by Peterson Ferreira da Silva (2011), it was during this period that José Viegas Filho, then Minister of Defense, visited South Africa and signed the Agreement on Cooperation in Defense Matters (approved nationally by Decree No. 784 of July 8, 2005). “On several occasions, Viegas emphasized the topic of cooperation as the north of his portfolio, including in the defense industry” (Silva 2011, 68). The minister was in favor of a regional cooperation between the IDBs, mainly because he considered that the countries had reached similar levels of technological and industrial development in the sector (Silva 2011). In 2006, the agreement between ARMSCOR and FAB was signed with Defense Minister Celso Amorim, who together with the then South African Defense Minister Mapisa-Nqakula affirmed the strategic commitment to cooperate multilaterally within



with the private sector, which is culturally poorly coordinated with the public sector.

Negatively, there were difficulties such as “the shortage of civilian specialists in the area of military technology, the insufficiency and discontinuity in the allocation of budgetary resources in the defense area, lack of inclusion in government plans of programs of acquisition of products in the long term and the disarticulation of C & T defense efforts, with little integration between scientific and technological institutions and national industry, and little promotion of research and development of defense-related products” (Brics Policy Center 2013, 04 ).

The strategic value of the project for Brazil goes beyond the technological and industrial development area, and also falls to strategic diplomacy. The Brazil-South Africa relationship that was already in the process of rapprochement is gaining momentum with the joint project, which may be the result of other countries’ cooperation in the area of defense industry, or even in other areas such as economic cooperation, social development, environment, culture and security and defense.

It is possible to analyze its importance, basically, in two levels. The first represents the potential of certain technologies used in the missile that may be applied in projects such as submarine surveys associated with oil exploration and unmanned vehicles (UAVs). The second covers the possibility of extension of – contacts and A-Darter experiences for other projects. Are visible, for example, the possibilities for joint development with the South African company Denel, along the lines of the A-Darter, a UAV with the FAB and a ground-to-air missile with the Brazilian Navy in addition to ongoing negotiations for the company’s potential involvement in Embraer’s KC390 program (Silva 2011, 73).

The A-Darter project as a cooperative project for the defense industry is daring: there is no prospect of war in the Atlantic or any other visible threat requiring a fifth-generation missile to protect the region, but both Africa and South America faces internal challenges ranging from political instability to drug trafficking among other problems stemming from its history and social inequality typical of developing regions. “The transnational nature of most of these threats underscores the fact that no single country is able to cope fully with its complexity, demanding multilateral responses that address the origins of problems and not just their symptoms.” (Silva 2011, 80). Thus, military technologies are much more a matter of projecting stability and regional development than a matter of threats.

With regard to the International System, successful cooperation in the creation of the missile helps developing countries such as Brazil and South Africa to become even more prominent on the world scene, in the end the mastery of technologies is essential for a position even more prominent in the system; we can see this when, in 2009, the list of the five largest military spenders was also the five permanent members of the United Nations Security Council (SIPRI 2010). In 2017 there was a change in the picture: the USA continues first with 35% and China also continues in second place with 13%, but in fifth place is now India (with 3.7%) and Brazil in 11th place (with 1.7%) together with Italy, that is, there was a further breakthrough from developing countries in the sector (SIPRI)<sup>14</sup>.

The project was relatively easy to implement because the two countries saw in the partnership a possibility of growth and overcoming mutual difficulties:

According to Aeronáutica, the main advantage of the A-Darter project for Brazilian companies is that it gives them the chance to participate in the global export market of a restricted and high technology product. “The Brazilian industrial park has the chance to sell products comparable to those available in developed countries that remain inaccessible to most of the world’s Armed Forces [...] (Silveira 2010<sup>15</sup>).

## Conclusion

Based on the study carried out, it is concluded that from an international cooperation project that generated a transfer of knowledge and technology in the offset model both countries of the bilateral project for the development of the A-Darter missile won: if on the one hand economized on cost-sharing, at the same time gained in terms of know-how, together being able to develop a degree of technology that would not be possible autonomously, becoming real competition in the defense products market.

Based on the transfer of technology that was accompanied by trainings for engineers and technicians, countries were able to work together

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14 Available in <<https://www.sipri.org/research/armament-and-disarmament/arms-transfers-and-military-spending/military-expenditure>> Access 08/13/2018

15 Journal Valor Econômico 06/25/2010. Available in <<https://www.valor.com.br/arquivo/832157/prototipo-do-missil-darter-entra-em-fase-de-teste-de-voe>> Access 08/14/2018



to learn from each other. In this way, political relations become more solid among countries that domestically leave the project with much more mastery of technological know-how that can be used in other projects. This knowledge allows actors from the global South to have more voice in the International System, with countries of the North and with the countries of the South, as they liberate themselves from the bonds of dependence being able to communicate with each other without the need of an intermediary.

This hypothesis is evidenced in a sense that there is a quest for greater independence in the technological development sector, especially in the IDB's role, but this independence is not necessarily autonomous, but rather is related to the independence of North-South dependency, thus creating a dialogue South-South cooperation that enables countries together to promote regional autonomy for the development of their military technologies. The sustainability of these projects, however, still is a matter of further studies since such projects run up against basic issues such as discontinuation of budget resources, little participation of private and mainly scientific institutions with the project, among others. In contrast, projects such as A-Darter will become even more solid and easier to carry out, since states can avoid such difficulties.

These initiatives are of great importance for the development of these countries, since they are motivated by the insertion that these countries may have in the International System, which in the future may generate privileged positions in World Organizations. Regionally these projects act due to greater regional influence of the participating countries, besides greater stability in the region characterized by common internal destabilization.

As Hansen, Buzan and Herring point out in their explanatory model, it is necessary to understand that one technology can and should overflow to the other. The gains obtained by Brazil should be used for the development of other technologies, not only military, but for small arms and, why not, civilian technologies, so that is a greater interaction with the public and the private, and especially a greater interaction with scientific institutions.

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### Abstract

In the present times marked by complex interdependence, an analytical concept which, according to Robert Keohane and Joseph Nye, "refers to situations characterized by reciprocal effects between countries or between actors in different countries" (2011, 22), there are two basic forms for states to act in the international system: through cooperation or conflict. As international cooperation is seen in this research as the relationship between actors in order to achieve joint action and development plans. Based on the hypothetical-deductive method and using the case study of the A-Darter missile, joint project between Brazil and South Africa, the objective of this article is to understand the model used for this case of South-South cooperation, specifically aimed at the defense products innovation, and what are the dynamics and consequences of these projects for the technological development of countries in the global South. The hypothesis is that there is a recurrent search for more independent and sustainable alternatives for technological development by countries of the global South, which, through joint projects and through the sharing of competences, can reduce world technological dependence. The aim is to understand the reasons, dynamics and consequences of South-South cooperation on defense based on the case study of the A-Darter missile. Specifically, the reasons for South-South cooperation for the development of the joint Brazil-South Africa project, its cooperation dynamics (objectives, characteristics and execution of the project) and positive and negative consequences of the initiative. The sources used will be secondary and primary, including through field research and semi-structured interviews. It is hoped to contribute to the understanding about the structure and conception of the selected cooperation case, its opportunities and difficulties, in order to highlight alternatives of advancement and that allow to strengthen new models of technological development to the Brazilian IDB, thus producing results with gains in capacities military, economic and national policies.

### Keywords

South-South Cooperation; BID; A-Darter Missile.

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