

# ARTICLE

## SUBNATIONAL EXPERIENCES IN THE DEFENSE INDUSTRY PROMOTION POLICIES: THE CASE OF RIO GRANDE DO SUL

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### Initial considerations

This article has as its main objective to present initiatives of the Government of the State of Rio Grande do Sul for the promotion of the defense industry of Rio Grande do Sul in recent years. Subnational entities have an important role to play in strengthening the national defense industry and, through the formulation and implementation of well-defined public policies, are able to act as facilitators and catalysts for national initiatives at the local level.

The construction of strategies for the development of the defense industry, as well as the ability to instrumentalize themselves to carry out the planned actions, is not exclusive to the states and provinces of rich and industrialized countries. On the contrary, there are several examples of how subnational entities in developing countries work together with the National State to strengthen the country's defense industry.

In this sense, this article seeks to provide examples that demonstrate the various public policies that can be implemented by subnational entities in developed countries (Australia, Canada and France) and developing countries

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(South Africa, India and Mexico), comparing them with what has been made in the Brazilian case. It is not intended here to make a systematic and delineated comparison to identify causal or correlational relationships between variables. Much less ambitious than this, our goal here is simply to illustrate the main argument proposed.

For the choice of cases, we use the pyramidal model of Bitzinger (2015) as an analytical tool of the international hierarchy of the defense industry. Thus, the exemplified cases represent distinct portions of the organizational pyramid proposed by the author, fulfilling our intention to bring examples with quite different reality to each other for the study. France is included in the second group in a classification of the capabilities of the national defense industry, which comprises six major categories, where the United States is isolated in the first group. The French technological capacity would be close to that of the US, but its industrial base and R&D expenditures are relatively smaller. Australia and Canada would be in the third group because they are considered advanced economies with a technologically consolidated military industrial fabric, but focused on specific niches, unlike France that dominates a much wider range of defense technologies. India would be in the fourth group, as it is a country with expanding industrial and technological capabilities and seeking to achieve as much independence as possible in arms supply, creating a broad technology base for its defense industry. South Africa and Brazil would be in a fifth category because they have a relatively small industrial base of defense with limited technology but at the same time they maintain pretensions of having capacities in several segments to sustain their regional power status. Finally, Mexico would find itself in the sixth and last group because it has very limited production capacities in the defense industry and low technological intensity, concentrating its efforts on specific niches, such as the licensing of less complex foreign weapons systems.

The theoretical premise of this article is that the defense industry, in addition to being essential for national defense, can aid in the strategy of endogenization of advanced technologies, a fundamental pillar for the economic development of a country. We consider that the Defense Industry is strategic for any country that wishes to maintain its sovereignty and its autonomy in the 21st century and is a key variable for the composition of National Power (Tellis et al., 2000). Thus, “state support for the defense industries is strategically justified because a developed Industrial Defense Base (IDB) enables the State to master its own technological capabilities, giving it additional power in the international system” (Mota and Rodrigues 2012, 3).

However, the IDB is also important in its aspects of economic and technological structuring “which are related to the domain of sensitive tech-

nologies, many with a dual character, and to the generation of innovation, high-skilled jobs and high value-added exports” (Melo 2015, 26). In this way, it makes sense that the defense industry is one of the priority axes of the economic and technological development strategy of a region. For the State to act in a transformative way in the industrial fabric of a country or a subnational region, it is necessary to develop a robust industrial policy. It is in this sense that the public policies directed to the development of the IDB must be aligned with the broad industrial policy of the State.

This article, in addition to this brief introduction, is divided as follows: i) in the first section, we discuss the concept of industrial defense policy and the dimensions of its implementation; ii) Subsequent examples of subnational experiences are presented in the formulation and implementation of initiatives to promote the local defense industry; and iii) in the third section, we point out the initiatives of the Government of the State of Rio Grande do Sul to strengthen the defense industry in Rio Grande do Sul. Finally, the last section is for the final remarks.

## Industrial Defense Policy

According to Hall, Markowski & Wylie (2010), defense industrial policy complements procurement policies in the sense that it is designed to encourage or direct investments in the necessary domestic industrial capacity if procurement is to demand local supply. A country may pursue a state policy that deems it necessary for local industry to be able to produce the defense materials either to maintain the operational sovereignty of its armed forces or for broader economic reasons. Therefore, industrial defense policies are focused primarily on establishing and maintaining national supply and support options for the Armed Forces.

Industrial Defense Policies become relevant if there is a strategic decision to rely on national suppliers to manufacture or support domestic defense capabilities to a greater or lesser extent, either now or in the future. The major goal of a defense industrial policy is to ensure the availability, reliability, and cost-effectiveness of national sources of defense supply. However, according to Hall, Markowski and Wylie (2010), these objectives can be conflicting, since the availability of national suppliers may depend on large investments in new factories and skills, diverting national resources from other areas. The small scale of production in some countries can be very costly and the availability of defense-related businesses will depend on high barriers to importing foreign defense products. These issues impact the cost-effectiveness of local production. On the other hand, relying on imports impacts on the reliability

of supply sources in times of crisis and conflagration.

Functionally, an industrial defense policy establishes guidelines on how to (i) establish, maintain and protect the required industrial domestic capabilities; (ii) ensure sufficiently reliable supply chains for the required industrial capacities; (iii) maintain the viability and readiness of national preferred suppliers to meet military demand requirements - and develop safeguard arrangements if there is a danger of supplier failure; and iv) manage costs related to local content policies.

In addition to guaranteeing the maintenance of the industrial capacity for production of defense materials in a country, an industrial defense policy is often also used to achieve broader economic purposes such as employment, innovation and the balance of payments. In relation to the use of defense industrial policies as a strategy for economic development by governments, there are several arguments, especially in relation to the spin-off processes of military technologies for civilian markets, the spillover of knowledge of technicians and scientists linked to military innovation, and the direct impact of the defense industry on GDP and exports.

Since it is decided to develop an industrial defense policy, i.e. if it decides politically to bear the costs of not necessarily seeking the most competitive price options in the international market in order to guarantee a certain participation of the national industry, the acquisition strategies vary in four basic possibilities (Hall, Markowski and Wylie 2010, 176-180): i) substitution of imports with margins of domestic preference, where it is admitted that local companies ensure that their products are acquired even if they are above the international price up to a certain percentage; ii) import substitution with local content policies, whereby the foreign supplier company is required to produce a certain fraction of the value of the contract in the national territory or to subcontract domestic companies; iii) replacement of imports with offset, where a certain portion of the contracted value requires counterparts from the country of the foreign company, whether from technology transfer, trade agreements, etc.; and (iv) division-of-labor agreements in multinational acquisitions, which seek to exploit competitive advantages among partner countries or demand high demands for economies of scale.

According to Berkok, Penney and Skogstad (2012), there are three main rationales among countries for designing their defense industrial policy: (i) on the one hand, import substitution logic seeks to develop domestic industry to reduce strategic dependence and economical for defense products from foreign countries. The most efficient tool for this would be the Armed Forces' own procurement policies, which would serve as on-demand promoters. Governments can purchase military equipment directly from the national

industry, or use offset agreements to require domestic co-production or licensed domestic production. In addition, robust coordination between government and domestic industry would facilitate import substitution as companies can make long-term adjustments and adaptations to address the needs of the National Armed Forces; ii) on the other hand, the logic of development of export capacity seeks to enable the domestic industry to enter the global value chains, and its core is in policies to promote supply. These policies are designed to allow domestic firms to be more easily integrated into the global marketplace, giving them competitive advantages in disputes over foreign Armed Forces contracts. Among the main instruments are the dissemination of information, coordination, development and retention of talent, support to small and medium-sized enterprises, and often direct support (subsidies, political lobbying, diplomatic bargains) of the government to promote its defense industry in other countries; and iii) finally, it is pointed out that a combination of both logics is possible.

Within these two approaches, Berkok, Penney and Skogstad (2012) identified six major dimensions of public policy that governments use to achieve their goals: 1. Coordination dimension between government and the Defense Industry; 2. Dimension of promotion and support to Research and Development (R&D); 3. Size of support for Small and Medium-sized Enterprises (SMEs); 4. Dimension of Support to the insertion in the global chain and value (GCV)<sup>2</sup>; 5. Dimension of creation of environments to promote competitiveness; and 6. Offset<sup>3</sup> size.

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2 According to Oliveira (2015, 38), “international trade has grown by an average of 5.4% annually during the last twenty years, at the same time as it undergoes profound transformations due to the new forms of organization and coordination of industrial production. The productive chain of goods, which previously was concentrated within a given country and most often in the hands of a single company, is now dispersed geographically and fragmented in several stages, called “global value chains”. The internationalization of value chains has also influenced the structure of defense industries. According to Dunne (2009, 27), “In addition to cross-border purchases of final products, companies are also shifting their supply chains, as is the case of BAE System purchases in South Africa. Increased offset agreements encouraged this development and gave the importing countries the opportunity to consolidate niche markets by being part of the supply chain of the major international producers. “ The author also argues that governments are increasingly recognizing the high costs of R & D for advanced defense technologies and that the viability of small country production goes through economies of scale that are only possible through international collaboration and cooperative industrial arrangements (2009, 27).

3 When countries decide to make a purchase for their military from a foreign supplier, it is relatively usual that some form of compensation, also called an offset, is required. According to Normative Ruling No. 764 / MD / 2002, offset is “any compensatory practice agreed upon by the parties as a condition for the importation of goods, services and technology, with the intention of generating industrial, technological and commercial benefits “(Brazil 2002, 12).

## Dimension of Coordination between Government and Defense Industry

Regarding the policies of coordination between government and the defense industry, it is important to point out the difficulties that the government may encounter in acquiring equipment within the required deadlines if there are no national companies ready to meet such demand. Companies, on the other hand, it is a challenge to keep employees and capital efficiently in a market in which the demand for military equipment is often not steady but sporadic and unstable. According to Berkok, Penney and Skogstad (2012, 55), policies that increase coordination between government and industry can alleviate these pressures and ensure a more stable defense industry. These policies can assist in import substitution, since it may be more attractive to buy from the domestic industry, as domestic firms may be better prepared to meet the demand of the country's military. In addition, this type of policy helps to build a base of information about the domestic industry itself, so that procurement policy makers and strategic project managers can more effectively target the demands for domestic firms.

As an example, the authors mention that the coordination between the Government of Israel and its Defense Industry is given much from the R & D systems in a permanent way, that is, independent of having a great anchor project. South Korea, in turn, has established an Integrated Project Team, composed of civilian and military personnel, to oversee and coordinate procurement initiatives and provide suggestions for improvement in planning, budgeting, and reliability of the project. The UK already has a program to pre-qualify some companies for future bids, preparing them to deal with their demands.

## Dimension of Promotion and Support to R&D

R&D promotion and support policies are usually justified by the perception that many technological advances result from investment in the defense industry and that there would be overflows to other sectors of the economy. More than that, according to Berkok, Penney and Skogstad (2012, 57), a country that systematically invests in companies that develop new technologies hopes to penetrate the global market and position its industry in the

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In this way, the determining factor of the offset possibility is the buying power of the importing country.

global supply chain. There is a growing demand for high-tech goods, and a country that reaches certain technological frontiers can sustain a strong export sector. In addition, if domestic firms do not have the technological and industrial know-how to develop and produce advanced armaments, the government will need to import from other countries. Thus, R&D investments respond both to the import substitution approach and to export promotion.

South Korea's R&D support policy focuses heavily on defense co-production agreements in order to secure technology transfer, seeking to develop domestic productive capacities in areas that do not have comparative advantages. Australia, on the other hand, provides subsidized financing for innovative and high-risk small and medium-sized enterprises that contain a high degree of technology and are aligned with the Industrial Capacity Priorities Program.

## **Dimension of Support to Small and Medium Enterprises (SMEs)**

Policies to support small and medium-sized enterprises (SMEs) begin to be developed from the diagnosis of an issue already debated in this thesis: the consolidation of the global defense industry in the few multinational prime contractors and the restrictions of entry to the international market. Considering that it is very difficult for companies of this size to be noticed by large integrators, thus making it difficult to enter the global supply chain, policies that promote assistance to SMEs can help them become exporters. According to Berkok, Penney and Skogstad (2012, 58), by becoming more efficient and ensuring greater sustainability, they can either provide for the national Armed Forces or secure space in the global chain from strategic partnerships, either with prime contractors or with foreign SMEs. In addition, the incentive to SMEs is related to the strategic imperative of mobilizing the economic and social fabric of a country in situations of national emergency, given the greater capillarity that SMEs have in society compared to large companies.

Australia has developed the Capability and Technology Demonstrator Program that enables SMEs to showcase their potential to large national and international companies and to contact foreign governments. In South Korea, there are a number of incentives for SMEs to enter the defense market, provided that, in return, they have the long-term goal of being internationally competitive. In Israel, most of its defense industrial base is made up of relatively large companies and the defense sector has few new entrants. In general, when there is some specific support for SMEs, it is through subsidies

for R&D.

## **Dimension of Support to the insertion in the global chain of value (GCV)**

The policies to support the insertion in the GCV include initiatives to SMEs, as well as incentives to large companies, since sales directly to other countries is usually done in gov-to-gov negotiations. Thus, these policies generally deal with the regulation of exports of defense products, with domestic product marketing initiatives, with facilitation of negotiation with foreign governments and multinational companies, and with special lines of credit for exports.

Approximately 70% of all weapons systems produced in Israel are exported, and this is made possible partly by strong government support in the international marketing of Israeli defense products, by international government-led missions and by the pro-activity of Israeli embassies in prosperous defense markets. Already the UK government acts more in the moment before the act of export. In defining the specific technologies that they intend to produce domestically, the English create specific research funds that allow the creation of technologically advanced products. From the purchase of the English products by its Armed Forces, the English government implicitly affirms the quality of the products, significantly facilitating their exports.

## **Dimension for Creation of Environments for the Promotion of Competitiveness**

An important step in sustaining a national defense industrial base is the establishment of an environment in which companies wish to invest. For this, it is necessary to consider four factors: i) development of technical and specialized manpower; (ii) clear market access regulations (standards and certifications); iii) competitive tax regime; and iv) adequate financing lines for the defense sector.

The defense industry is usually very technical, requiring a highly specialized workforce. Thus, public investments are necessary for the development of technical schools, vocational courses and higher courses directed at the area of defense. According to Berkok, Penney and Skogstad (2012, 59), entry barriers in the defense market need to be diminished, since dealing with extensive and obscure regulations may alienate entrepreneurs. In addition,

fiscal architectures that enable defense companies to be more competitive in the international market and lines of finance that understand the special logic of the defense sector are also important for establishing a thriving private investment environment in the area.

Australia has a special workforce training project in areas that seek to maintain industrial and technological capacity to stimulate a competitive environment. Called “Skilling Australia’s Defense Industry” (Skilling Australia’s Defense Industry), this program offers scholarships pursuing three objectives: to improve workers already employed in the Defense Industry; increase the quantity and quality of workers focused on priority areas in defense; provide funds for the defense companies themselves to offer training activities in areas where there is a lack of human resources with technical, business or management skills. The Israeli policy to promote a competitive environment for investment, especially foreign investment, in the country is to allow foreign investors to buy up to 49% of domestic companies, with incentives especially for the reduction of the value invested in counterpart requirements.

## Offset dimension

Offset policies have been widely used by many countries. While some use offsets to create jobs or trade-offs for balance of payments balance, most countries see technology transfer opportunities there. Some governments have been requiring offsets for all contracts above a certain amount, usually as a fraction of the value of the purchase agreement.

The South Korean offset policy states that 50% of the total value of the contract should be subject to compensation, 60% of which should be of a technological and industrial nature, such as co-production, technology transfer, R&D investment and technical development. Sweden’s policy is narrower, requiring 100% of the contract value in technological offsets, mainly co-production elements, with indirect offsets such as investments in the domestic industry or commercial counterparts being ineligible.

In the next section, we will exemplify subnational experiences in defense industry promotion policies both in countries with an advanced industrial and technological development degree and those with an industrial fabric and a system of innovation still in development. In studying the cases, we will use the conceptual framework presented above, identifying the defense industry promotion policies presented by Berkok, Penney and Skogstad (2012).

## Subnational Experiences in the Defense Industry Promotion Policies

Subnational entities have played diverse roles in terms of industrial policies and promotion of business competitiveness in their territories. With specific regard to the promotion policies of the defense industry, several examples are possible to be quoted in various parts of the world, with various actions, focused both on supporting the development of regional clusters and the promotion of R&D, among others. In this section, we will cover cases of states and provinces of countries with an industrial fabric and developed technological capabilities (specifically, Canada, France and Australia), as well as subnational experiences in countries whose development conditions are more similar to those in Brazil South, India and Mexico).

Canada, home to one of the largest aerospace companies in the world - Bombardier has an industry in the aerospace industry that generates \$ 27.2 billion in revenue and about 90,000 jobs<sup>4</sup>. The concentrated aerospace industry in the province of Quebec accounts for about 50% of industry revenue in Canada, with \$ 14.4 billion in annual sales, 40,000 jobs and 190 small, medium and large companies<sup>5</sup>.

Created in 2006, Aero Montreal is an organization that brings together the leading companies, research and educational institutions, associations and unions in the Quebec aerospace sector, with the objective of supporting the development of the aerospace value chain and promoting the region as a hub for international excellence<sup>6</sup>. In addition to being funded by its associate members, Aero Montreal also has resources from the Government of the Province of Quebec and the Government of Canada. In 2014, Aero Montreal secured three-year financial assistance of approximately 1.5 million Canadian dollars from the Canadian government in order to develop related projects to increase productivity in the aerospace supply chain and strengthen competitiveness and networking actions in the sector<sup>7</sup>. Likewise, Aero Montreal is also supported by the Government of the Province of Quebec: the 2016-2021 Quebec Aerospace Strategy allocates \$ 250 million over five years to support

4 Aerospace Industries Association of Canada (AIAC). Industry Statistics. <http://aiac.ca/industry-statistics/>. Accessed on July 11, 2017.

5 Aero Montreal. Reports and Documents. <https://www.aeromontreal.ca/reports-and-documents.html>. Accessed on July 11, 2017.

6 Aero Montreal. Institutional site. <https://www.aeromontreal.ca/>. Accessed on July 10, 2017.

7 Market Wired. "AeroMontreal Receives \$ 1,584,150 in Funding from Government of Canada". <http://www.marketwired.com/press-release/aero-montreal-receives-1584150-in-funding-from-government-of-canada-1906355.htm/>. Accessed on July 10, 2017.

the development of the aerospace industry, diversify the industrial cluster, accelerate the expansion of SMEs and support innovation projects, in particular related to green aviation technologies<sup>8</sup>.

The French aerospace industry is undeniably a global powerhouse, with the Airbus Group being the leader in the manufacture of civil aircraft in the world. Ranked second in the world in terms of revenue, behind US alone, annual French aerospace sales reached \$ 66.2 billion in 2013. This amount accounts for 2.42% of national GDP, the highest percentage among countries leaders in aerospace production. In 2008, France exported 75% of its aerospace production, accumulating US \$ 49.7 billion in exports (Gardes et al. 2015).

Since mid-2000, France has been reshaping its industrial policies and instituting, within a national financing program, the Competitiveness Poles, explicitly inspired by Porter's model for the formalization of links between local authorities, research organizations and companies with a view to economic development through innovation (Gardes et al. 2015). Thus, in 2005, the Aerospace Valley was created, a bi-regional competitiveness hub (Midi-Pyrénées and Aquitaine) dedicated to the aeronautics, space and embedded systems sector. With the aim of promoting internationally local industry, shared innovation and supply chain competitiveness, Aerospace Valley has tripartite governance and funding: 1/3 is from the French government; 1/3 of the regional governments; and 1/3 of membership fees. Currently, the cluster has more than 840 members, including 80 prime companies, 500 SMEs and a number of universities and research establishments. Thus, one third of the French labor force allocated in the aerospace sector is concentrated in this cluster, totaling about 125 thousand workers<sup>9</sup>.

South Australia, self-styled the State of Defense in Australia, is home to some of the top Australian defense companies responsible for the largest and most complex projects in the country, as well as having a large military presence and defense infrastructure installed. Owning large yards, South Australia has conquered A \$ 50 billion from the Future Submarine program for construction at Techport, plus A \$ 35 billion from the Frigate of the Future program.

Due to the importance of the defense sector for the State of South Australia, Defense SA was created, a government agency responsible for dealing

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8 Aero Montreal. Québec Government's 2016-2017 Budget. <https://www.aeromontreal.ca/release-quebec-government-2016-17-budget.html>. Accessed on July 10, 2017.

9 Aerospace Valley. Institutional site. <http://www.aerospace-valley.com>. Accessed on July 11, 2017.

with all matters relating to the defense industry in the State. Thus, the agency articulates the main actors of the defense, both nationally and regionally, in its Steering Committee, and, working closely together with local industry, aims to attract investments, expand opportunities, support the training of skilled labor and establish infrastructure. In addition, the Agency formulated and is implementing the South Australia Defense Strategy 2025, which sets out the main guidelines for strengthening the defense industry in the state<sup>10</sup>.

The South Australia State Development Department is committed to enhancing innovation and collaboration through specialized clustering dynamics. From 2013 to 2017, the state government invested A\$ 5 million Australian dollars in six projects, two of them in the aerospace and defense sector<sup>11</sup>: the Australian Aerospace Alliance (AAA) and the Alliance for Specialized Vehicles Vehicle Alliance - SVA). The first is a collaborative project between the Defense Teaming Center<sup>12</sup>, the defense industry and the Development Department, with the aim of promoting state enterprises internationally and working with key actors in the production chain to disseminate advanced manufacturing practices in productive processes. The second deals with the South Australian Defense Industry Automotive Integration Project (SADIAIP), which prospects and facilitates the diversification of automotive companies in the region to also offer in the defense market, with the objective to design specialized military vehicles for export, especially focusing on the Southeast Asian market.

Subnational entities from countries with a less developed industrial fabric or a relatively poor technological innovation infrastructure are also capable of developing specific industrial policies for defense. We can see that, in these cases, the policies are enough to attract new investments in the productive chain of the sector and for the absorption of technologies, especially through offset programs.

In South Africa, Gauteng, the country's main industrial province, has a strong program of attracting investment and supporting exports, participating in fairs and supporting the international marketing of local businesses. The City of Tshwane, formerly called Pretoria, is the administrative capital of South Africa and one of the largest cities in Gauteng Province. It is considered South Africa's aerospace and defense technology development hub,

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<sup>10</sup> Defense South Australia. South Australia Defense Strategy 2025. <http://www.defencesa.com/about-defence-sa/south-australias-defence-strategy-2025>. Accessed July 10, 2017.

<sup>11</sup> Australia. Department of State Development - Clusters. <http://statedevelopment.sa.gov.au/industry/innovation/clusters>. Accessed on July 10, 2017.

<sup>12</sup> The Defense Teaming Center is a non-profit association representing the defense industry of South Australia. <http://www.dtc.org.au>. Accessed on July 10, 2017.

hosting South African industrial giants like ARMSCOR, DENEL Dynamics and Aerosud. In August 2013, the City of Tshwane, through its Economic Development Agency, signed a partnership agreement with the Aerospace Industry Support Initiative (AISI), a body linked to the Department of Trade and Industry (DTI) of South Africa to promote the aerospace and defense sector, in particular the development of SMEs to supply the region's prime prime contractors. Among the projects covered by this agreement is the Centurion Aerospace Village (CAV).

Centurion Aerospace Village (CAV) is a DTI initiative for the development of a specific cluster for the defense and aerospace industry around the city of Tshwane. Its goal is to increase the competitiveness of installed companies to provide global value chains through the physical location close to major players such as DENEL and AEROSUD. The idea is to create an attractive space for international and national defense companies and transform the CAV into a global export platform. The improvement of the competitiveness of companies would come especially from the logistic efficiency resulting from co-location, sharing of services and facilities, the possibility of training SMEs and stimulating shared R&D<sup>13</sup>. However, there are strong criticisms of the project, since its inauguration in 2008 were spent almost US \$ 10 million and obtained very little results. Currently, Parliament has been investigating possible irregularities in the bidding for earthmoving of the land and fraud and corruption in relation to the only company installed<sup>14</sup>.

Another case is the state of Punjab, India. Strongly aligned with Indian industrial policy, called Make in India, Punjab has guided its public policies of innovation and investment attraction to the aerospace and defense industry. One of the great attractions used by the state is its strong base of small and medium-sized engineering firms, which contribute more than 15% of Punjab's total exports, as well as its leading universities for aircraft maintenance engineering. The most interesting instrument they have are specific programs of federal offset programs, that is, they can identify, from their local capillarity, the companies that are able to absorb that offset, that technologi-

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<sup>13</sup> South Africa. Department of Trade and Industry. CAV Presentation: Portfolio Committee on Trade and Industry CAV CEO, 2015. <https://www.thedti.gov.za/parliament/2015/CAV.pdf>. Accessed on October 5, 2016.

<sup>14</sup> See in The Citizen. "R90m spent on Centurion Aerospace Village, nothing on site". September 17, 2015. <http://citizen.co.za/775690/r90m-spent-on-centurion-aero-space-village-nothing-on-site/>. Access on October 5, 2016. Also see in Helfrich, Kim. Nothing happening at Centurion Aerospace Village DA maintains. DefenseWeb, September 18, 2015. [http://www.defenceweb.co.za/index.php?option=com\\_content&view=article&id=40786:nothing-happening-at-centurion-aerospace-village-of-maintains&catid=35:Aerospace&Itemid=107](http://www.defenceweb.co.za/index.php?option=com_content&view=article&id=40786:nothing-happening-at-centurion-aerospace-village-of-maintains&catid=35:Aerospace&Itemid=107). Accessed on October 5, 2016.

cal transfer that is being caused by the big contracts the country is doing. In addition, they use competitive tax incentives to attract investment, promoting opportunities especially in the aircraft repair and maintenance sector<sup>15</sup>.

In recent years, an aeronautical cluster has emerged in the state of Querétaro, Mexico. In 2013, the aeronautics industry in Querétaro represented 10% of the state's gross domestic product and employed 5,000 people. The Aerocluster de Querétaro has an average of 17% annual growth in the last ten years<sup>16</sup>, and between 1999 and 2016, Foreign Direct Investment (IED) for the manufacture of aeronautical equipment in the state amounted to approximately US\$ 1 billion<sup>17</sup> and counted with investments from Bombardier, Airbus, Safran and Aernnova. The cluster, which unites national and international companies, academy and state and federal government, developed from integrated actions between the Government of Mexico and the Government of Querétaro focused on the promotion of foreign investment, regional technological development, strengthening of local suppliers and training of human capital<sup>18</sup>. Currently, the cluster already maintains its governance in a sustainable way, with government support for specific projects<sup>19</sup>. Based on a robust articulation among the actors of the cluster, including cross-shareholdings between companies, an environment conducive to R&D investment was created, bringing a level of sectorial expertise and positioning the cluster as the first to attract aeronautical investments in Mexico.

Finally, in Brazil, we also have experiences in the defense sector of development policies implemented through subnational initiatives. In the dimension of organization and industrial optimization, one of the main poli-

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15 Punjab. "Invest in Punjan Aerospace and Defense Sector". Available at: [http://investpunjab.gov.in/Content/documents/Collateral/AerospaceandDefence\\_Col.pdf](http://investpunjab.gov.in/Content/documents/Collateral/AerospaceandDefence_Col.pdf). Accessed on August 3, 2017. See also HINDUSTAN TIMES, "Young entrepreneur to set up Punjab's 1st defense, aerospace parts unit". <http://www.hindustantimes.com/punjab/young-entrepreneur-to-set-up-punjab-s-first-defence-aerospace-parts-unit/story-FfWVpk8vllacU2dXfwp61K.htm>. Accessed on August 3, 2017.

16 Índice Político. "Ubican a Querétaro como el Paraíso para la Industria Aeroespacial de México". <http://www.indicepolitico.com/ubican-a-queretaro-como-el-paraíso-para-la-industria-aeroespacial-de-mexico/>. Accessed on August 11, 2017.

17 El Financiero. "Crece 170% la IED de equipo aeroespacial em Querétaro". <http://www.elfinanciero.com.mx/bajio/crece-170-la-ied-de-equipo-aeroespacial-en-queretaro.html>. Accessed on August 11, 2017.

18 Aerocluster Queretaro. "Mapa de ruta del sector aeroespacial de la región de Queretaro". [http://aeroclusterqueretaro.mx/images/PDF/Mapa-de-ruta-del-Sector-Aeroespacial-de-la-Regin-de-Quertaro-c\\_portada-10022016.pdf](http://aeroclusterqueretaro.mx/images/PDF/Mapa-de-ruta-del-Sector-Aeroespacial-de-la-Regin-de-Quertaro-c_portada-10022016.pdf). Accessed on August 11, 2017.

19 El Financiero. "El cluster aeronáutico de Queretaro ya vuela solo". <http://www.elfinanciero.com.mx/economia/el-cluster-aeronautico-de-queretaro-ya-vuela-solo.html>. Accessed on August 11, 2017.

cies developed are those of integrated support to the local productive arrangements. Local Productive Arrangements (APLs), a term that means something similar to the cluster, are agglomerations of companies, located in the same territory, that present productive specialization and maintain links of articulation, interaction, cooperation and learning among themselves and other local actors, intensifying the relationship networks and link the participants' competitiveness. In August 2004, the Permanent Working Group for Local Productive Arrangements - GTP APL was established through Interministerial Ordinance No. 200, of August 2, 2004. Involving dozens of governmental and non-governmental institutions, the GTP APL is coordinated by the Ministry of Industry, Foreign Trade and Services, through the General Coordination of Local Productive Arrangements and has the "attribution of elaborating and proposing general guidelines for the coordinated action of the government in supporting local productive arrangements throughout the national territory"<sup>20</sup>.

Public policies for the development of APLs tend to be fairly federalized, sometimes fostering the Union, sometimes states or municipalities. Specifically with regard to the aerospace and defense sector, we find in the example of Aerospace and Defense APL, centered in São José dos Campos / SP, the consolidation of a historical cooperation movement between companies, universities and Armed Forces that dates back to the origins of the Brazilian aerospace sector with the establishment of the Department of Aerospace Science and Technology (DCTA) and the Institute of Aeronautical Technology (ITA) within the Brazilian Air Force respectively in 1945 and 1950. Having an APL format, the BAC was formed in 2009 and brings together about 120 companies from six Brazilian states, but most of them (60%) are based in São José dos Campos, including within the Technological Park of São José dos Campos. The anchor company of the project is Embraer and, in all, there are almost 25 thousand jobs with annual revenues of US\$ 7 billion<sup>21</sup>. There are a number of benefits offered to companies associated with the APL to increase their competitiveness and opportunities, such as internationalization programs, training and certification, as well as participation in national and international fairs, trade missions, business roundtables and consortium formation. This APL is an example in which the entity supports the Union, through programs of APEX Brazil and ABDI, being the articulator the Center

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20 Observatório Brasileiro de APLs. Site institucional. [http://portalapl.ibict.br/menu/itens\\_menu/gtp\\_apl/gtp\\_apl.html](http://portalapl.ibict.br/menu/itens_menu/gtp_apl/gtp_apl.html). Accessed on November 22, 2016.

21 Technological Park of São José dos Campos. Institutional Site. <http://www.pqtec.org.br/conheca-o-parque/quem-somos.php>. Accessed on November 23, 2016.

for Competitiveness and Innovation of the Cone Leste Paulista (CECOMPI)<sup>22</sup>.

ABDI has an interesting project in partnership with the Technological Park of São José dos Campos and EMBRAER, the Aeronautical Chain Development Program (PDCA). The program helps Embraer's supply chain companies to become technically and technologically capable of securing their space in the domestic supply chain and integrating into international value chains. PDCA, started in 2014, was able to increase the productivity of companies, reduce costs and waste, reduce business risks and raise the level of exports of products. New technologies dominated by the program allowed companies to participate in the KC-390 military jet transport chain and the new E-Jets E2 commercial jet family. In 2010, the industry produced about 32,000 different types of parts and, by 2015, this portfolio of parts more than doubled<sup>23</sup>.

APL Polo de Defesa (*Defense Pole* in English) de Santa Maria/RS, in turn, is an APL whose financial resources come from the State Government. Through the State Program for Strengthening Local Production Chains and Arrangements, coordinated by the Gaucho Agency for Development and Investment Promotion (AGDI), resources are transferred to the Santa Maria Development Agency (ADESM) to manage the joint actions of the APL<sup>24</sup>. The main actions of the APL are articulation between local authorities and the Federal Government and the Armed Forces, in order to promote the initiatives of the Defense Pole, as well as participate in fairs and national and international missions for the commercial promotion of companies in the sector and of actions of mobilization of the IDB of the State<sup>25</sup>.

Finally, as an example of an initiative fomented by municipal entities, we have the APL of Defense of the Great ABC, coordinated by the Economic Development Agency of the Great ABC, whose main sponsor is the Intermunicipal Consortium of the Greater ABC, composed of the municipalities of Santo André, São Bernardo do Campo, São Caetano do Sul, Diadema,

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22 CECOMPI. Aerospace Cluster. <http://www.cecompi.org.br/aero/en/aerospace-cluster>. Accessed on November 23, 2016.

23 Agência Brasileira de Desenvolvimento Industrial. "Programa estimula inovação na indústria aeronáutica". [http://www.abdi.com.br/Paginas/noticia\\_detalhe.aspx?i=4097](http://www.abdi.com.br/Paginas/noticia_detalhe.aspx?i=4097). Accessed on December 1, 2016.

24 A Razão. "Polo de Defesa de Santa Maria é reconhecido como APL". <http://www.arazao.com.br/noticia/70693/polo-de-defesa-de-santa-maria-reconhecido-como-apl/>. Accessed on November 23, 2016.

25 Observatório Brasileiro de APLs. "Plano de Ação do Polo de Defesa de Santa Maria". [http://portalapl.ibict.br/export/sites/apl/galerias/Biblioteca/APL\\_de\\_Defesa\\_-\\_Plano\\_de\\_Axo\\_do\\_Polo\\_de\\_Defesa\\_de\\_Santa\\_Maria\\_2015.pdf](http://portalapl.ibict.br/export/sites/apl/galerias/Biblioteca/APL_de_Defesa_-_Plano_de_Axo_do_Polo_de_Defesa_de_Santa_Maria_2015.pdf). Accessed on November 23, 2016.

Mauá, Ribeirão Pires and Rio Grande da Serra<sup>26</sup>. Since the severe crisis that the region's automotive sector has been experiencing, local governments are looking for alternatives for regional development. Thus, they identified in the defense sector the possibility of resuming the growth of the local industry, focusing the APL for the diversification of production and complementation of lines in nontraditional defense industries.

## **Rio Grande do Sul: initiatives to promote the defense, security and aerospace sector**

Due to its geographical position frontier, historically Rio Grande do Sul counts on numerous concentration of military in its territory. In the city of Rio Grande, in the south of the state, is located the headquarters of the 5th Naval District of the Brazilian Navy, with jurisdiction to operate in the maritime area of the coast of Rio Grande do Sul, Santa Catarina and Paraná. Porto Alegre, capital of the state, hosts the Southern Military Command (CMS) of the Brazilian Army, whose mission is to maintain sovereignty in the Southern Region of Brazil. To this end, it has about 50,000 military personnel (25% of the Brazilian Army) and 75% of the mechanized means that exist in the ground force. In Canoas, in the Metropolitan Region of Porto Alegre, there is the headquarters of ALA 3, a military organization in charge of the Brazilian Air Force (FAB) in the States of the South - Paraná, Santa Catarina and Rio Grande do Sul. are accompanied by many military organizations scattered throughout the state.

The defense industry of Rio Grande do Sul, in turn, is quite diverse, participating in different strategic projects of the Armed Forces. Rio Grande do Sul is the third state in billing and in number of companies in the Defense sector (FIPE 2014). The State counts on important companies suppliers of the Armed Forces, like the Strategic Companies of Defense Taurus (light armament), Axur (cyber defense) and Agrale (military utilities). In addition, AEL Sistemas is the main Brazilian supplier of avionics for the FAB, being part of the Gripen fighter project, being responsible for Wide Area Display (WAD), Head-Up Display (HUD) and Helmet Mounted Display (HMD). In turn, KMW Brasil is responsible for the maintenance and modernization of armored vehicles of the Leopard and Gepard family acquired by the Brazilian Army.

Given the competencies already established in Rio Grande do Sul and

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26 Agência de Desenvolvimento Econômico do Grande ABC. Site Institucional. <http://www.agenciagabc.com.br/>. Accessed on November 23, 2016.

its vocation for military affairs, the State Government has been emphasizing the strategic importance of the defense, security and aerospace industry in the technological and economic development of the state. The political foundation of this conception is rooted in the National Defense Strategy itself (2008), in which the decentralization of the strategic productive chains is seen as a matter of national sovereignty.

In this sense, the Gaúcha Agency for the Development and Promotion of Investment (AGDI), between 2013 and 2015, and subsequently the Secretariat for Economic Development, Science and Technology (SDECT), sought to establish an increasingly collaborative partnership with Ministry of Defense, the Ministry of Development, Industry and Foreign Trade (MDIC) and other ministries and federal entities to capillize and catalyze the actions of the Federal Government in the State with regard to the defense and aerospace sector. As an example of this approach, it is possible to cite a joint project between MDIC and AGDI to prospect European partner companies in the manufacture of small satellites for both civil and military applications<sup>27</sup>.

Likewise, the articulation with relevant entities that deal with the promotion of the defense industry in Rio Grande do Sul, such as ADESM (Santa Maria Development Agency) and COMDEFESA/FIERGS (Defense and Security Industry Committee of the Federation of Industries of Rio Grande do Sul), is one of the focuses of the State Government, through the SDECT. At the end of 2014, an agreement was signed between ADESM, COMDEFESA/FIERGS, Santa Maria Tecnoparque and the State Government with the objective of creating an institutional and financial framework that would enable actions to be taken to promote the local defense industry<sup>28</sup>. Through this agreement, the brand was created “Defense and Security Sector Rio Grande do Sul-Brazil”, developed promotional graphic material and established a joint strategy.

A wide range of actions was implemented in 2015 in the institutional umbrella created by the agreement. In April, there was an institutional stand at the LAAD Defense & Security Fair, the most important defense sector fair in Latin America, held every two years in Rio de Janeiro<sup>29</sup>. Between July and

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27 Diálogos União Europeia e Brasil. “Brasileiros visitam Escócia e Itália para conhecer projetos de fabricação de pequenos satélites”. <http://www.sectordialogues.org/noticia/brasileiros-visitam-escocia-e-italia-para-conhecer-projetos-de-fabricacao-de-pequenos-satelites>. Accessed on September 27, 2017.

28 DefesaNet. “Polo de Defesa de Santa Maria”. <http://www.defesanet.com.br/bid/noticia/18289/Santa-Maria---Polo-de-Defesa--um-ano-de-atuacao-e-muitos-desafios-pela-frente/>. Accessed on September 27, 2017.

29 Diário de Santa Maria. “Representantes do Polo de Defesa de Santa Maria participarão de feira internacional no Rio de Janeiro”. <http://diariodesantamaria.clicrbs.com.br/rs/economia-politica/noticia/2015/03/representantes-do-polo-de-defesa-de-santa-maria-participarao-de>

September, the Cycle of Mobilization Lectures of the Defense Industry of Rio Grande do Sul took place. During three events, held in Santa Maria (with a focus on simulators and cyber defense<sup>30</sup>), in Porto Alegre (Aerospace<sup>31</sup>) and Caxias (supplying to the Armed Forces<sup>32</sup>), 40 lectures were held, with about 340 participants. Finally, in November, the II International Seminar of Defense (SEMINDE) was held in Santa Maria. The event brought together some 250 participants, including businessmen, military personnel, representatives of public authorities and institutions linked to the sector, researchers and specialized press to discuss opportunities in Brazil's defense sector<sup>33</sup>.

An important mechanism for fostering R & D and innovation are the Science and Technology Briefing of SDECT. Since 2015, defense and aerospace have been a priority theme in these notices. In 2015, more than 14 million reais were fomented in several projects. Specifically, in this year, there was no contemplated defense project. Meanwhile, in 2013, Santa Maria Park was awarded R \$ 2 million to build a high-tech structure for the development of simulators focused on the defense industry<sup>34</sup>.

There are also public policies in Rio Grande do Sul relevant to the creation of a business environment more conducive to cooperation, innovation and competitiveness of local companies, such as the Local Productive Arrangements (APLs) program. The State has a strong history of policies to promote cooperation between companies, which is a well-established program to promote local economies. Currently, the State Government, through the SDECT, foments about fifteen APLs, with more than 40 already estab-

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feira-internacional-no-rio-de-janeiro-4726946.html. Accessed on September 27, 2017.

30 Rio Grande do Sul. "Indústria de Defesa gaúcha promove ciclo de mobilização em Santa Maria". <http://www.rs.gov.br/conteudo/221330/industria-de-defesa-gaucha-promove-ciclo-de-mobilizacao-em-santa-maria>. Accessed on September 29, 2017.

31 Agência de Desenvolvimento de Santa Maria. "Setor de Defesa e Segurança do Rio Grande do Sul promove workshop aeroespacial no Tecnopuc". <http://adesm.org.br/noticias/setor-de-defesa-seguranca-rio-grande-sul-promove-workshop-aeroespacial-tecnopuc>. Accessed on September 29, 2017.

32 DefesaNet. Seminário de Fornecimento para as Forças Armadas. <http://www.defesanet.com.br/bid/noticia/20106/COMDEFESA-FIERSG----Seminario-de-fornecimento-para-as-Forcas-Armadas/>. Accessed on September 29, 2017.

33 Infodefensa. Seminário Internacional de Defesa de Santa Maria. <http://www.infodefensa.com/latam/2015/09/26/noticia-seminario-internacional-defesa-santa-maria.html>. Accessed on September 29, 2017.

34 ADESM. Convênio destina mais de 2 milhões de reais para implementação de centro de desenvolvimento de simuladores no Santa Maria Tecnoparque. <http://adesm.org.br/uncategorized/convenio-destina-mais-de-2-milhoes-de-reais-para-implementacao-de-centro-de-desenvolvimento-de-simuladores-santa-maria-tecnoparque>. Accessed on September 29, 2017.

lished in Rio Grande do Sul. The Santa Maria Defense APL was recognized in 2015<sup>35</sup> and was granted with resources for improvement of its governance, in the amount of R \$ 150 thousand, in order to: hire a manager and assistants to manage the APL; acquire infrastructure for the management team; obtain subsidies for articulation meetings, lectures and company training events; and participate in business fairs, such as the 2016 IDB participation.

Finally, SDECT, through its Commercial Promotion and International Affairs Board, has three important business support programs that can be used by the local defense industry. The Support Program for the Participation of Gaúcho Companies in International Fairs, created in 2000, has a long history of support to thousands of gaúcho companies that seek to internationalize and expand their exports. In 2016, the program supported four defense companies in Rio de Janeiro to exhibit their products at the Military Simulation and Technology Conference (CSTM, in Portuguese) in Brasília<sup>36</sup>. In addition to the fair program, there is also the InvestRS program, an agreement signed between SDECT and FIERGS to carry out joint investment attraction activities for Rio Grande do Sul. Among the strategic sectors listed for proactive actions to attract investment is the defense, aerospace and security. In addition, the program has as its goal the support of companies from Rio Grande do Sul that are seeking international partners, both to raise financial resources, to joint technological development and to establish commercial partnerships.

## Conclusion

This article had as its main objective to demonstrate the initiatives of the Government of the State of Rio Grande do Sul to promote the defense industry of Rio Grande do Sul. Therefore, we seek to briefly review the main concepts and theoretical aspects that involve the industrial policies of defense, as well as to exemplify public policies promoted by other subnational entities around the world. This methodological path was traced to reinforce the idea that it is possible and necessary that the subnational entity (states and municipalities, in the Brazilian case) be involved, together with the National State, in promoting the defense industry, both serving as a facilitator and catalyzer

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35 ADESM. "Mais um APL para Santa Maria". <http://adesm.org.br/noticias/mais-um-arranjo-produtivo-local-para-santa-maria-apl-polo-de-defesa-reconhecido-pelo-governo-estado>. Accessed on September 29, 2017.

36 Rio Grande do Sul. "Conferência com foco em simulação termina nesta quinta-feira em Brasília". [http://www.rs.gov.br/conteudo/240889/conferencia-com-foco-em-simulacao-termina-nesta-quinta-feira-em-brasilia/termosbusca=\\*](http://www.rs.gov.br/conteudo/240889/conferencia-com-foco-em-simulacao-termina-nesta-quinta-feira-em-brasilia/termosbusca=*). Accessed on September 29, 2017.

of national initiatives in the region as acting as protagonist in the execution of specific public policies for the local reality.

The examples presented in the second section of the paper have sought to demonstrate that public policies aimed at strengthening the defense industry at the subnational level are not exclusive to developed countries, not even those of the select group with the leading global prime contractors. France is the only example we have brought from a developed and traditional defense products manufacturer. Canada and Australia are already countries with well-developed and technologically advanced industrial arrangements, but they do not fit into the categories of defense industry leaders. Although with different realities, there are cases of success that can be replicated, with due adjustments, to the Brazilian reality.

The South African, Indian and Mexican cases, closer to the context of Brazil, show that the activities of the states and provinces can play a very important role in the consolidation of the national defense industry. The articulation between national defense strategy and subnational development projects needs to be close in order for the defense industry to find an environment conducive to flourishing.

Rio Grande do Sul has great potential to strengthen itself as a relevant subnational actor in the defense industry. Certain states of the Federation exist for the attraction of large industrial and technological projects, and, in the specific case of defense, the states of the Southeast are the natural candidates to receive such investments. However, the current changes in the policy of SUDENE (Southeast Development Superintendency) and SUDECO (SUDECO) authorizing the financing of defense industries with the constitutional funds of the Northeast and Midwest, put the states of these regions in an advantageous position. Against this background, the State Government, in partnership with regional actors, must quickly articulate public policies focused on specific funding for defense and on encouraging research and innovation, to attract new companies, but mainly to in the state are already.

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## ABSTRACT

This article has as its main objective to present initiatives of the Government of the State of Rio Grande do Sul for the promotion of the defense industry of Rio Grande do Sul in recent years. Subnational entities have an important role to play in strengthening the national defense industry and, through the formulation and implementation of well-defined public policies, are able to act as facilitators and catalysts for national initiatives at the local level. This article seeks to bring examples that demonstrate the various public policies that can be implemented by subnational entities in developed countries (Australia, Canada and France) and developing countries (South Africa, India and Mexico), comparing them with what has been done in the Brazilian case.

## KEYWORDS

Defense Industry; Subnational entities; Rio Grande do Sul.

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