Intellectual Property Indicators in the Mesoregions of the State of Alagoas-Brazil

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The objective of this study is to analyze local, innovative and sustainable development in the three Mesoregions of Alagoas, through intellectual property indicators (patents, trademarks, industrial design and geographical indications). The methodology consists of the analysis of secondary sources extracted from the Statistical Database on Industrial Property (BADEPI), available on the website of the National Institute of Industrial Property (INPI), for the years 2010 to 2017. The results point out marked differences, with the eastern Alagoas mesoregion concentrating the intellectual property indicators with two geographical indications, 95.93% of the patent deposits and 84.73% of the deposits of trademark registrations, as well as industrial designs and computer programs. Agreste Alagoano presents a reasonable amount of intellectual protection, with emphasis on the municipality of Arapiraca. Sertão Alagoano, on the other hand, has the worst situation, low amount of intellectual property, even in a region with a diversified cultural and environmental environment. Thus, it was found that the Mesoregions of

Alagoas need an ecosystem that invests in the innovation process in the region, especially the Sertão Alagoano.

Keywords: East Alagoano; Agreste Alagoano; Sertão Alagoano; intellectual protection; local development.

1 Introduction

In the last two decades of the twentieth century, there was an increase in the perception of developed and developing countries in relation to the value of innovative activity. Perception arising from the development and consolidation of economic analysis and the proposal for regional development based on sustainability and innovation.

The focus of regional development for the growth of its territory/ location, in part, depends on what is being placed on human capital (education and knowledge in innovation). Thus, the sustainable innovation system is based not only on an economic category, but above all on a social system with cooperation playing an important role (Pelse et al., 2018). Capello and Lenzi (2019) reiterate that the insertion of human capital in local environments is beneficial in strengthening knowledge networks and local economies.

Thus, according to Tkachenko and Bodrunov (2014), there is a direct relationship between the economic development of a region and the formation of elements of the knowledge-based economy. With that, it becomes important to increase the intellectual potential, the adequate infrastructure for development and an innovative regional policy. However, it is not enough to just develop these factors, it is necessary to combine regional innovation policy with regional economic policy, to ensure that the population has quality of life, opportunity and development of creative skills, that is, the development of human capital, at the local level.

According to Lentz (2019), in regional development it is necessary to pay special attention to the social side, or better, the local knowledge of the population and the people who live in the region. In addition, one must understand the whole process, given the complexity of the actors that make up such an ecosystem and, with this, perceive the correlation of land use, agrarian technologies, business needs and social and demographic changes.

The innovation and knowledge networks are gaining visibility due to the political mechanisms aimed at regional development. Political actions include investments in directly productive activity and indirect social capital, in addition to strengthening intraregional migration as a means of obtaining and attracting individuals with varied backgrounds, resulting positively for innovation in these regions (Van Aswegen; Retief, 2020).

In the face of changes and business complexity, the search for competitive advantage has been changing the way organizations are positioned in the market. In this scenario, the practice of product and process innovation has become increasingly relevant for business maintenance, since innovation needs proper planning of activities, realistic goals, permanent monitoring of activities under development and measurement of results (Kisman; Tasar, 2014; Vázquez - Barquero; Rodríguez - Cohard, 2018).

The innovation process needs to be stimulated by the creation of an economic environment, companies need to be encouraged to do their part in this process, as knowledge will be transformed into products and production processes, and alignment with universities, research institutions and scientists is important. , given that there is a debate on how protection mechanisms can guarantee the best returns for society, with better and cheaper products and services. However, it should be noted that there is a fine line in over-protecting assets and the impact on innovation that could prevent new technologies from being developed (Negri, 2018).

Considered a measured value that provides information about a specific phenomenon or a status quo for companies, the indicators are fundamental for managing and controlling the various innovative ideas and concepts to which they are submitted. Equally important are the selection criteria for allocating resources and assessing performance at each stage of the innovation process efficiently (Dziallas; Blind, 2019; Sleuwaegen; Boiardi, 2014; Pelse et al., 2018).

The need for intellectual protection as a way to guarantee economic rights over technological innovations in the world, definitively established the importance of consolidating National Innovation Systems as a means for the economic development of nations.

From this perspective, there is an important growth in the number of intellectual protections worldwide, as well as the formation of technological innovation clusters in specific regions of the globe and in the most diverse thematic areas (Streltsova; Linton, 2018).

Technological innovations have caused conceptual changes in several aspects, both for causing greater flexibility in production processes and for causing changes in the productive structure of countries and their regions (Fochezatto; Tartaruga, 2018).

It must be agreed that the search for a real understanding of the phenomenon of technological innovation has stimulated the development of methods aimed at measuring it. This aspect is relevant to the proposed discussion about the referred process regarding the factors that influence and contribute to innovation in different regions of the Brazilian territory.

An innovation process must observe the economic and geographical position, the level of socioeconomic development and the economic specialization of the region (Mikhaylova, 2019). Thus, the challenge for regional development lies in the fact that the regions are complex systems, and the appropriate thing would be not to map but to decide what would be mapped and why, identifying problems and solutions, guaranteeing the sustainable prosperity of the place (Harrison et al., 2020).

Under these aspects, the main objective of this paper is to analyze local, innovative and sustainable development in the three Mesoregions of Alagoas, through intellectual property indicators (patents, brands, industrial design and geographical indications), from 2010 to 2017.

Thus, it is intended, in a theoretical way, to strengthen the field of intellectual property research and its interrelation with regional development, in addition to the relevance of the study with an interdisciplinary approach, with innovative, local and sustainable development for the Mesoregions of Alagoas. In addition, it highlights the importance for the knowledge of public policy makers, by contributing to the visualization of how investments can be directed and are being directed in the Mesoregions of the state of Alagoas.

2 Methodology

What are the intellectual property indicators in the Mesoregions of the state of Alagoas? To answer this question, a survey of information / data was carried out on the indicators of patents, brands, industrial design and geographical indications located in the municipalities that make up the three Mesoregions of Alagoas, formed by the, East Alagoano, Agreste Alagoano and Sertão Alagoano, to an overview of the distribution of intellectual property in that state.

The research used was carried out by means of secondary sources from the extraction of information through the Statistical Database on Industrial Property (BADEPI), available on the website of the National Institute of Industrial Property (INPI), for the years 2010 to 2017, regarding patent indicators, trademarks, industrial design and geographical indications. Regarding the processing of information, Microsoft Office Excel 2019 software was used. Thematic maps were made using the QGIS software.

In theoretical terms, readings were carried out in journals, monographs, dissertations and theses. Other sources of information were the websites of the Brazilian Institute of Geography and Statistics (IBGE), Atlas of Human Development (UNDP), National Institute of Industrial Property (INPI), DATASEBRAE, Food and Agriculture Organization of the United Nations (FAO) and the data available at the State Secretariat of Planning, Management and Heritage of Alagoas (SEPLAG-AL).

3 Population, Territorial, Economic, Educational and Social Characterization of the Mesoregions of the State of Alagoas

The state of Alagoas has 102 municipalities divided into three Mesoregions (Figure 1), East Alagoano, Agreste Alagoano and Sertão Alagoano, with a population of 3,120,494 inhabitants in 2010, and a territorial area of 27,843,295km² (Table 1).

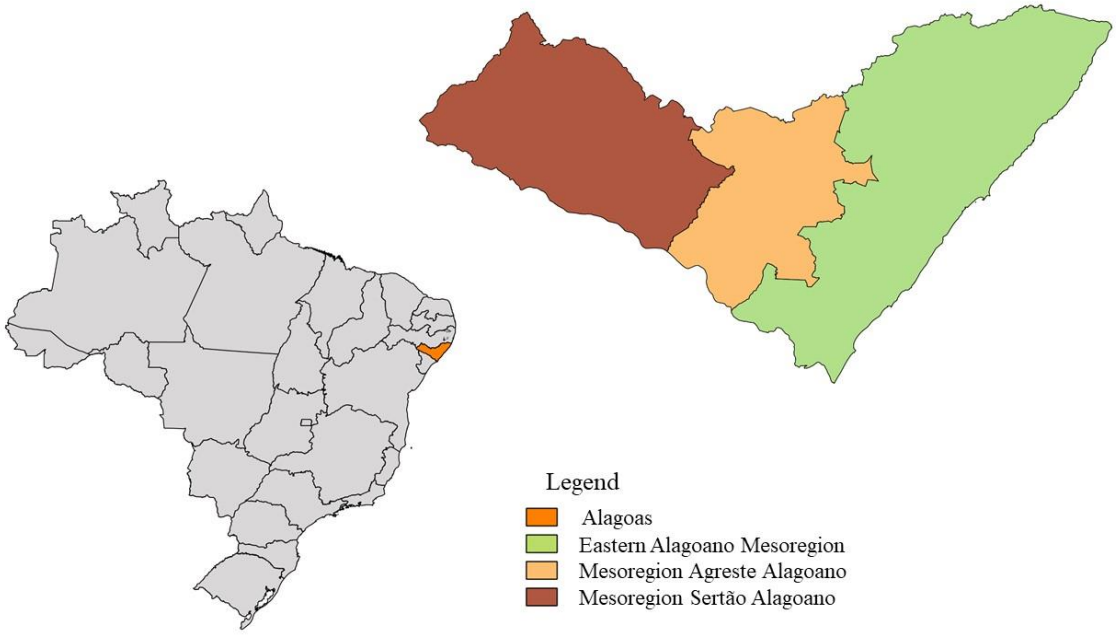

Figure 1 - Map of the State of Alagoas and its Mesoregions
Source: Prepared by the authors from Map portal – IBGE (2019).

The state's Human Development Index (HDI) in 2010 was 0.631, the worst or lowest among Brazilian states. With regard to GDP, Alagoas obtained, in 2017, equivalent to 52.843 billion reais, 41.31% of which is concentrated in the capital Maceió. In Alagoas, 36,149 companies and other organizations were registered in 2018. With regard to higher education, the state has 29 public and private institutions registered in the Higher Education Census, 18 of which are located in the capital and 11 in the interior (SEPLAG-AL, 2019; Cities - IBGE, 2020; INEP, 2019).

Table 1 - Resident population and territorial extension - Mesoregions of the state of Alagoas - 2010

Alagoas Mesoregions	**Resident population**		**Territorial extension**	
	Abs.	**%**	**km²**	**%**
East Alagoano	2.064.525	66,16	13.241	47,66
Agreste Alagoano	623.302	19,97	5.770	20,77
Sertão Alagoano	432.667	13,87	8.769	31,57
Total	**3.120.494**	**100,00**	**27.780**	**100,00**

Source: Prepared by the authors from Cities - IBGE (2020); Atlas of Human Development in Brazil – UNDP (2013).

With regard to the East Alagoan Mesoregion, it has 52 municipalities, with a population of 2,064,525 inhabitants, in 2010 and, thus, concentrates 66.16% of the inhabitants of the state, in a territorial area of 13,241 km^2, which represents almost 48% of the Alagoas territory. The capital Maceió stands out as the largest economy in the state, with a GDP (R$ 1.000) of 21,827,917 in 2017. This value is mainly driven by the industrial sector for the manufacture of food products and the manufacture of organic and inorganic chemicals. As well as civil construction, the result of building construction and infrastructure works, in addition to the services sector. In 2018, 17,841 companies and other active organizations were registered. With regard to the population of the capital (Maceió), in 2010, this alone concentrated almost 30% of the state or 932,728 people, in a territory of 509,320 km², and the Municipal Human Development Index (HDI-M) of 0.721 considered as a high level of human development (SEPLAG-AL, 2019; Cities - IBGE, 2020).

Agreste Alagoano, on the other hand, is formed by 24 municipalities, in a territorial extension of 5,770 km^2, with a population of 623,302 inhabitants, in 2010, corresponding to 19.97% of the state's residents. The main municipality in the mesoregion is Arapiraca, which has the second largest GDP in the state, with R$ 4.100.975,00, for the year 2017, reflecting the service sectors and its sub-sectors, such as administration, education, health, public research and development, defense and social security; trade, maintenance and repair of motor vehicles and motorcycles. And also due to the agricultural sector, being in 3rd place in relation to the other municipalities in the state. In this category, the result was driven by tobacco, cassava and pineapple crops. In addition, 4,100 companies and other organizations active in Arapiraca were registered in 2018. The Municipal Human Development Index (MHDI) was mean represented by 0.649, and has a population of 214,006 people, and a territorial area of 345,655 km², in 2010 (SEPLAG-AL, 2019; Cities - IBGE, 2020).

With regard to the Alagoas Hinterland, composed of 26 municipalities, in a territory of 8,769 km^2, with a resident population of 432,667 inhabitants in 2010, which represents only 13.87% of the Alagoas population. Santana do Ipanema is the municipality of the mesoregion with the best placement, and according to the 2017 GDP, it was R$ 513.982,00, making it the 13th economy in the state. This result is due to the industrial and service sectors. Regarding the number of companies and other active organizations registered in Santana do Ipanema, in 2018, it was 514. The municipality's population was 44,932 people in 2010, in a territorial extension of 437.875 km², and has a Municipal Human Development Index (MHDI) of 0.591 classified as low in 2010 (SEPLAG-AL, 2019; Cities - IBGE, 2020).

It should be noted that due to the socioeconomic, demographic and higher education indicators presented, the Mesoregions of Eastern Alagoas and Agreste Alagoano have the best indicators. In turn, the Sertão Alagoano mesoregion is characterized as the least populous and with the least economic development, however, it has the second largest territorial dimension (31.57%) of the state, in an extension marked by the presence of the São Rio Francisco and the caatinga biome, which presents a lot of diversity and riches (SEPLAG-AL, 2020). Thus, these three Mesoregions, in particular the Sertão Alagoano will be analyzed in section 4, the spatial distribution of intellectual property, in the Mesoregions of Alagoas, a factor that may be capable of triggering local, innovative and sustainable development, especially in less developed mesoregion, the Sertão Alagoano.

4 Results and discussion

In this section, we will highlight the profile of intellectual property by the industrial property indicators (patents, trademarks, industrial design and geographical indications) existing and distributed in the state of Alagoas, selected municipalities and in the three Mesoregions of the state and in some municipalities with greater highlights.

4.1 Distribution of Patents, Brands and Industrial Designs in the Mesoregions of Alagoas

In the state of Alagoas, from 2010 to 2017, 246 patents were filed, fluctuating over the years, and from 2014 it grows uninterruptedly. In 2017 alone, Alagoas had 60 patents deposited, this amount being pulled by the capital Maceió (53 patents). If we consider Mesoregions, in Agreste Alagoano we have Arapiraca and Palmeira dos Índios; in Eastern Alagoas, Junqueiro, Maceió, Marechal Deodoro, Rio Largo, Santa Luzia do Norte and São Miguel dos Milagres; and in the Sertão Alagoano, no patents were registered.

Table 2 - Deposits of types patents (Invention + Utility Models) by municipalities in the state of Alagoas from 2010 to 2017

Municipalities	**Years**								**Total**
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	
Arapiraca	2	0	2	1	1	0	0	3	**9**
Junqueiro	0	0	0	0	1	0	0	0	**1**
Maceió	23	8	12	35	24	34	37	53	**226**
Marechal Deodoro	0	0	0	0	0	0	4	2	**6**

Palmeira dos Índios	0	0	0	0	0	0	1	0	**1**
Rio Largo	0	0	0	0	0	0	0	1	**1**
Santa Luzia do Norte	0	0	0	0	1	0	0	0	**1**
São Miguel dos Milagres	0	0	0	0	0	0	0	1	**1**
Total	**25**	**8**	**14**	**36**	**27**	**34**	**42**	**60**	**246**
Percentage	**10,16**	**3,25**	**5,69**	**14,63**	**10,98**	**13,82**	**17,07**	**24,39**	**100,00**

Source: Prepared by the authors from INPI (2018).

Note: Considers the 1st resident depositor

With regard to the two municipalities with the highest patent filings after the capital Maceió, Arapiraca filed 9 patents in the analyzed period, with the largest filings in 2010 (2), 2012 (2) and 2017 (3). Such conditions are due to the fact that this municipality is the 2nd largest economy in the state and has the 2nd largest number of inhabitants among the municipalities. Marechal Deodoro represents the 3rd municipality with patent filings. As for the aspects that may be responsible for the deposits, this municipality has the 3rd largest GDP in Alagoas, pulled by the secondary sector, particularly the chemical-plastic chain, in addition to public and private universities (SEPLAG-AL, 2019; Cities - IBGE, 2020).

Regarding the requests for registration of trademarks, in the state of Alagoas, or better, in the three Mesoregions of Alagoas, in the period from 2010 to 2017, 4,335 were made (Figure 2). The highest percentages of orders were in 2017, with 20.35% (882) of the total, followed by 2016 with 16.08% (697). On the other hand, the years with the lowest percentage were 2010, with 6.69% (290), and 2012 with 7.98% (346).

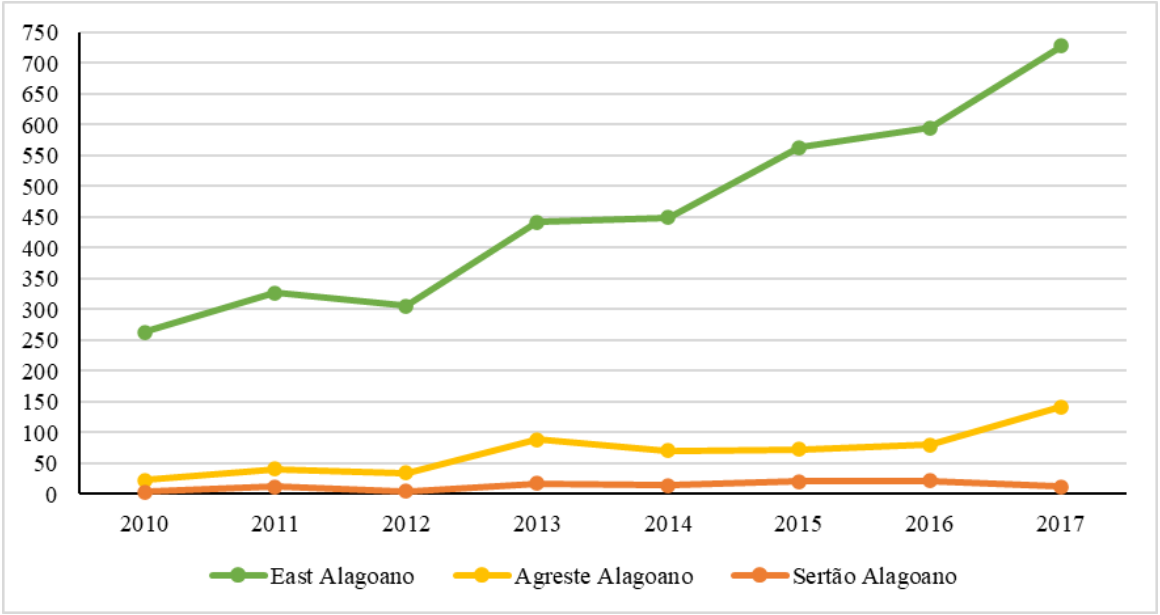

Figure 2 - Trademark registration requests - Mesoregion of Alagoas - 2010 to 2017

Source: Prepared by the authors from INPI (2018).

By mesoregion, Eastern Alagoas concentrates the largest number of trademark applications (3,673), with the largest applications in 2017 (728) and 2016 (595), and the years with the lowest applications were

2010 (263) and 2012 (306). By municipalities, the capital Maceió presents more orders, corresponding to 3,207, followed by Marechal Deodoro (60) and Maragogi (54), but with much lower values compared to the capital. The other municipalities range from 1 to 43 trademark registration requests.

In Agreste Alagoano, 554 registration requests were made, with the highest numbers in 2013 (89) and 2017 (80) and the lowest in 2010 (23) and 2012 (35). The municipalities that contributed to the total requests for trademark registrations in the mesoregion were Arapiraca (439) and Palmeira dos Índios (62), the other municipalities oscillating between 1 to 10 requests.

Considering the Alagoas Hinterland, it presented the lowest number of trademark applications (108) among the Mesoregions of the state. The largest orders were in 2016 and 2017, with 21 and 22 orders, respectively, and the smallest quantities in 2010 (4) and 2012 (5). The municipalities with the highest number of requests were Santana do Ipanema with 27, Delmiro Gouveia with 30, Piranhas with 10 and Major Isidoro with 14. The rest of the municipalities ranged from 1 to 7 in terms of registration requests.

With regard to industrial designs, (Figure 3) shows a total of 54 deposits in selected municipalities. The years 2013 and 2014 had the highest quantities, 13 and 12, respectively, and the lowest were in 2010 (1) and 2015 (2). These values are concentrated in two Mesoregions, East Alagoano, with Maceió (52), which has the largest amounts of industrial design deposits, and Agreste Alagoano with two municipalities (Arapiraca and Palmeira dos Índios), with 1 deposit in each municipality, with no values found in any municipality that is part of the Mesoregion of Sertão Alagoano.

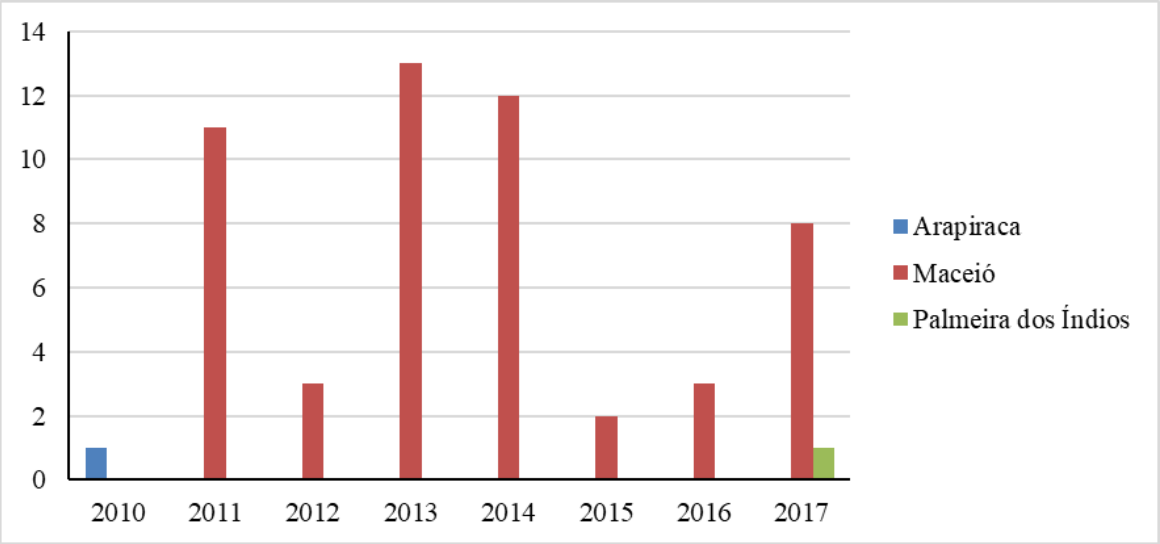

Figure 3 - Applications for deposit of industrial designs - Selected municipalities -2010 to 2017
Source: Prepared by the authors from INPI (2018).

In summary, there is a concentration of intellectual property in the mesoregion of Eastern Alagoas, particularly in the capital Maceió, possibly associated with factors such as: concentration of public and private universities, industries and companies. Given this context, for a state to grow and develop, it is necessary to advance in its entire territorial extension: capital, metropolitan area and interior. With this, it will be possible to promote local development also in the interior and in the regions characterized as

poorest, such as the mesoregion of the Sertão Alagoano, which has a low rate of intellectual protection and local development.

From these results, it appears that patent filings could serve as an indicator for the achievement of the Sustainable Development Goals (SDGs), in this case, SDG 9 (industry, innovation and infrastructure) and SDG 17 (partnerships and means of Implementation). SDG 9, for thinking about a more sustainable and inclusive industrialization and an environment that fosters innovation that values local businesses and communities, and SDG 17, for advocating internationalization, that is, the circulation of knowledge.

Thus, brands have the mechanism of adding value and credibility to the product, as it is a visual form that can make a product known, but unlike geographical indications that have a seal that is also a collective brand, it does not have the function of determining origin and product quality. However, in many cases they will have similar functions as a marketing tool (Calboli, 2015), promotion of local territorial development (Carvalho; Pereira; Ferreira, 2017), essential for international trade (Mancini et al., 2016).

In addition, certifications and brands that protect and value heritage and typical products should be given attention by policy makers (Lorenzini; Calzati; Giudici, 2011). In many European Union countries, the Community trademark was introduced as a substantial element of uniformity in the scenario of the valid internal market (Machnicka, 2014).

An important element is the creation of technological centers in Alagoas, which are geographically divided into three environments, whose mission is research, scientific development and technology. Two are in activity, one in Agreste, in the city of Arapiraca (Agribusiness Technological Pole), and another in Sertão, in the municipality of Batalha (Agribusiness Technological Pole). On the other hand, the third is located in Maceió (Information, Communication and Services Technology Hub), and is still being finalized.

It is important to highlight that these environments are indispensable for innovative development, as they are directly linked to scientific research, for the transformation and consequently applicability in the university, productive sector and society (Silva; Silva Neto, 2018).

4.2 Geographical Indications in the Alagoas Mesoregions

In the scope of the diversity of strategies for product differentiation, Geographical Indications (IGs) provide interested parties with an opportunity for products with characteristics strongly linked to the territory of origin. However, the protection and regulation mechanisms for the use of GI, require individuals to be organized and collaborate in the process (Quiñones-Ruiz et al., 2016).

In the Northeast of Brazil, there are 14 geographical indications, 11 of which are in the Northeastern Semi-arid. As for the state of Alagoas, it has two IGs (Region of Lagoas Mundaú Manguaba and Manguezais de Alagoas), all located in the eastern Alagoas mesoregion, with no IG in Agreste Alagoano and Sertão Alagoano (Giesbrecht, 2014; DATASEBRAE, 2020; INPI, 2020).

The geographical indication Region das Lagoas Mundaú Manguaba (Figure 4) was registered in 2016, whose protected product is fillet embroidery. The geographical area corresponds to 252 km², around the Mundaú and Manguaba Lagoons, located in the Center-East portion of the state of Alagoas, comprising part of the territories of the municipalities of Marechal Deodoro, Pilar, Santa Luzia do Norte, Coqueiro Seco, Satuba and Maceió. This mesoregion is populated and inhabited by fishermen and shellfish gatherers who make a living or supplement their household income by making the embroidery traditionally produced

in the region. In addition, it is characterized by being a tourist area and a diverse gastronomic pole. Thus, the place that was established with fillet embroidery, developed a production chain that covers populations and communities (DATASEBRAE, 2020; Giesbrecht, 2014; INPI, 2020).

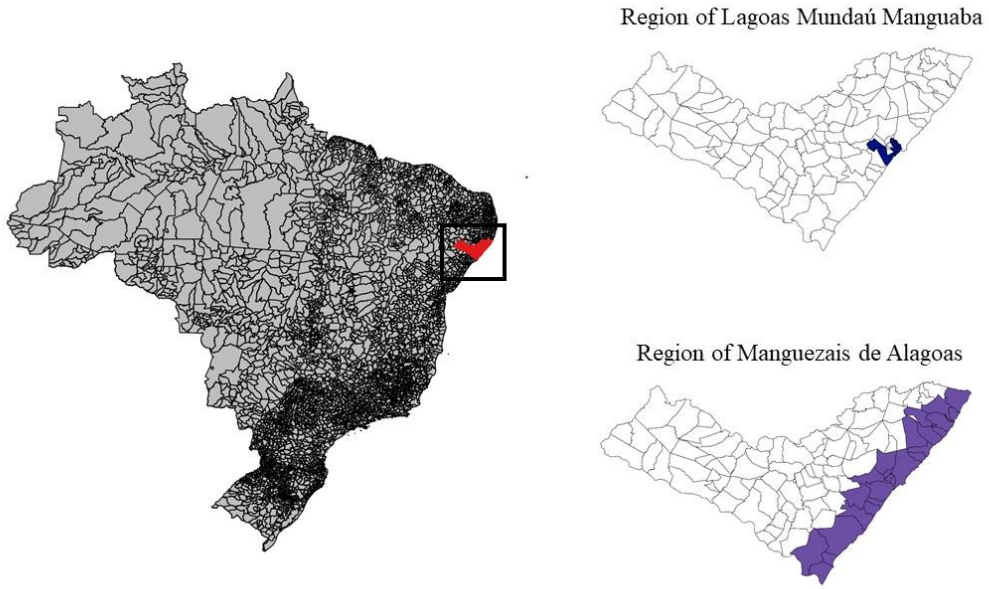

Figure 4 - Map of the Geographical Indication of map of Alagoas-Brazil
Source: Prepared by the authors from Map portal – IBGE (2019).

The IG Manguezais de Alagoas (Figure 4) was registered in 2012, with red propolis and red propolis extract extracted from the legume *Dalbergia ecastophyllum* as a protected product. It should be noted that the chemical and pharmacological characteristics of propolis are unique. Regarding the geographical area, the coastal region and lagoon complex of the state of Alagoas is delimited (DATASEBRAE, 2020; Giesbrecht, 2014, INPI, 2020).

Thus, it appears that the geographical indications in the state of Alagoas are located only in the mesoregion of Eastern Alagoas. Therefore, it becomes necessary to explore the potential of Agreste Alagoano and especially the Sertão Alagoano, by contributing economically and socially to deal with the economic problems of communities that have traditional characteristics and the differential of being located in a rich and little explored biome.

In this sense, some aspects and characteristics of the geographical indications must be analyzed for a greater basis in relation to this important mechanism for local development, sustainable development and with social innovation.

According to Maiorki and Dallabrida (2015), the geographical indication could contribute to the development of the local territory, by adding value to the production chain and local trade, however, it is not able to develop a territory alone, there are other factors that need to be considered. acquired and put into practice.

Registration with the National Institute of Industrial Property (INPI) alone does not guarantee that the result of the process is responsible for bringing together multiple sectors such as tourism and services, framing the territory with the appreciation of its tangible and intangible assets (Lima Medeiros; Terra; Passador, 2019; Maiorki; Dallabrida, 2015; Silva et al., 2012).

According to Billi (2016), it is essential that the actors are involved and articulated, cooperating to achieve common goals. Since the beginning of the GI process, there must be a feeling of belonging by the actors, and at the same time they must be able to claim the collectivity (Kizos et al., 2017).

As listed by Nascimento, Nunes and Bandeira (2012), associating the product with the region's historical and cultural heritage, with the strengthening of tourism consisting of welcoming tourists, tourist routes and organizing events, provides the development of other activities and services, encompassing the entire community in the process.

Most GI products are associated with the agricultural environment, many coming from poorer regions (Cerdan, 2014). In this sense, GI products would contribute to stimulating and supporting the rural environment for local sustainable development processes. It is worth highlighting the multiple dimensions involved in IG, with regard to the development of intellectual property, with the policy of agricultural markets, social policy, food security, preservation of local natural resources, food culture and tourism promotion (Belletti; Marescotti; Touzard, 2017).

Thus, according to FAO (2019), a successful IG when it has the possibility of creating jobs, fosters local development, provides means to guarantee food security, preserves traditional products and services and biodiversity.

Another point to be addressed is the potential of geographical indications for sustainable development, based on production geared towards sustainability and environmental preservation, and also contributes to achieving the Sustainable Development Goals (SDGs) and Agenda 21, including the SDGs 2 (eliminating hunger and improving nutrition), SDG 12 (sustainable patterns of food production and consumption) and SDG 5 (women's empowerment) (FAO, 2019; FAO, 2018).

Therefore, the capacity of the state of Alagoas with the geographic indication tool is verified, through the IGs Region of Lagoas Mundaú Manguaba and Manguezais de Alagoas, each with its own specificity. In this context, the local knowledge of the Mesoregions of Agreste Alagoano, and notably the Sertão Alagoano, could be evaluated, which could contribute to the generation of jobs, female empowerment, maintenance of the population in the countryside, preservation of the environment and a feeling of appreciation for the local culture.

5 conclusion

It emerged from the study that the state of Alagoas must seek to decentralize industrial properties, given that the mesoregion of eastern Alagoas, mainly the capital Maceió, accounts for the largest amounts of intellectual property. It is necessary to create an ecosystem of investments in public policies and innovation, in order to develop an innovative culture throughout the state, especially in the Sertão Alagoano mesoregion, as it is the least developed, but it presents remarkable characteristics in the diversity of local knowledge.

In addition, research must be supported by public and private entities, in order to meet the objectives of regional / local market demands for new products and processes. So that it is the beginning of a virtuous and diffuse cycle, based on the emergence of innovative products, the technological supply of the market, an increase in production capacity and efficiency and an increase in competitiveness. These factors, to a certain extent, would be capable of enhancing the economic and social development of the regions, as is the case of the state of Alagoas and its Mesoregions.

Some limitations of the study, it is due to the INPI data, to verify only the 1st resident depositor, not being possible an overview of the other depositors and if the product and / or process development was through both national and international partnerships in the case of patents. Another limitation is the non-possibility of crossing variables, for example, number of 1st resident depositors per university or company. In addition, the variables may not represent the complete reality of the regions. Thus, for future research, focus on a micro region or municipality in Alagoas, through field research.

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