COMPETITIVE FACTORS IN MARINE CLUSTERS: A LITERATURE REVIEW

Abstract: Maritime clusters are industrial agglomerations that have a direct relationship with the sea in their economic activities. Given the recent increase in literature on strategy and maritime clusters, especially on the competitiveness characteristic of clusters, this study aims to group the dimensions of competitiveness present in the literature, checking the number of publications, main journals and which dimensions of competitiveness most explored in the literature, considering the search in titles, keywords and abstracts. A systematic review of the literature was carried out in accordance with the research gap identified by Stravroulakis, Papadimitriou & Tsirikou (2021), which suggests mapping the competitiveness factors of maritime clusters, grouped according to Porter's (2017) classification. Used the Ebscohost, Web of Science and Scopus databases. As a result, it appears that despite the theoretical distinction between port cluster and maritime cluster, Ports are the main research unit of maritime clusters, in all competitiveness factors, contributing to the literature by reducing the relevance, in terms of scientific production, among the expressions. There is a predominance of publications on macroeconomic factors and an increase in the number of publications on the topic over time investigated, with the main origin of publications being Asian, with little academic production from Latin America. It innovates by consolidating the three main databases, complementing previous studies that use the databases separately.

Keywords: Strategy **;** Competitiveness; Clusters; Maritime business; Regional development; Systematic literature review

1. Introduction

A maritime *cluster* can be understood as an industrial complex, as an agglomeration of interconnected industrial sectors in which a community-based network prevails (Doloreux, 2017). The objective and results of the agglomeration are to facilitate regional economic growth, in addition to boosting related segments such as Tourism, Logistics, Steel, Energy clusters, among others (Zhang et al, 2017).

Understanding the contribution of agglomeration economies provided by such *clusters* to regional competitiveness is essential for both public policies and private strategies, given their power to transform social reality (Doloreaux, 2016; Li, 2019). They are, therefore, important territorial ordering units with impacts on territorial governance, urban management, strategic plans, among others (Ribeiro, Chamusca, 2020).

Maritime industries contribute around US$1.5 trillion (2.5%) to global gross value added (OECD, 2016) Their relevance in international organizations such as the UN, World Bank, European Commission, OECD, among others , has gained prominence for involving cultural, energy, biodiversity, climate and economic interests.

Interests have gained space, including in the context of institutional policy of States, as is the case of Japan (OECD, 2000), Quebec, Canada (Québec, 2015) which implemented “Quebec's Maritime Strategy” in 2015, or the European Union Integrated Maritime Policy (2007). In the Strategy and competitiveness literature, the set of ocean-based industries is treated as a cluster of interconnected industries, i.e, clusters. (OECD, 2016; Doloreux,2016;Salvador,2016)

Studies on maritime business strategies are an emerging field in both strategy and maritime economics literature (Wang & Mileski, 2019). Bibliometric studies on maritime economics are segmented into specific operations and research repositories, e.g., bibliometric research dedicated to the maritime transport segment using the Web of Science database (Fiskin & Cerit, 2020) or maritime tourism (Selvaduray et al., 2022) using the Web of science and

Scopus platforms. Furthermore, Li & Luo (2020), in a systematic review on maritime clusters, suggest mapping competitive characteristics to maritime *clusters* , especially as an attempt to better define the concept of maritime *clusters* .

Much of the research on maritime business that uses bibliometric techniques focuses on the environmental perspective, such as reducing pollutant emissions from the maritime industry (Jimenez et al., 2022; Tolochko & Vadrot, 2021; Davarzani et al., 2016), the exploration of cooperative ocean exploration and discovery systems as in Wang et al (2016); or specifically to the maritime transport and container industry (Fiskin & Cerit, 2020), the latter considering the publication of the Web of Science database over the last 5 years. In Wang et al (2016) there is a comparative bibliometric study between the main countries of the International Ocean Discovery Program, at the time China ranked 6th in number of publications and 10th in terms of first authors and corresponding authors. This scenario has changed, which will be noticed in the development of this research.

Studies focused on management present literature on diagnosis and efficiency and results of maritime *clusters* , especially European and Asian ones. Among the countries whose maritime *clusters* have already been mapped are Norway (Amdam, Bjarnar, 2015; Benito et al, 2003), Ireland (Brett, Roe, 2010), England (Chang, 2011), Netherlands (De Langen, 2002), Canada (Doloreux et al., 2009) and Portugal (Salvador, 2016), which developed studies on the strategic dynamics and behavior of their maritime *clusters* such as growth, interaction between sector segments and competitiveness opportunities.

The dynamic and asymmetrical development of *clusters* allows us to analyze and compare realities such as London and Hong Kong, which were the subject of studies by Zhang et al (2017), which was carried out based on the main ports of these locations and the relationships between other maritime sectors such as insurance. and ship brokerage, both with the aim of becoming international and global maritime hubs. However, in these studies, port performance alone does not guarantee the development of the *cluster*, which must be accompanied by other operations and added services, an argument in favor of the importance of studying the sector from the perspective of a *cluster* or agglomeration. Thus, this research expands the object of study, going beyond port operations, and delimiting the maritime *cluster* as a unit of investigation.

Governments have used industrial organization in clusters from the point of view of strategic management to increase national economic performance and ensure development and competitiveness, as is the case of the Thai government (Wonglimpiyarat, 2006), which invests in this strategy to develop research and technology (*knowledge-based economy*). Because they are part of a broader competitiveness framework, clusters emerge in response to the circumstances of a location and improve the economic performance of activities in that location (Ketels, 2017), whether nationally or internationally.

The competitiveness factors were extracted mainly from Porter (2017) and Porter & Ketels (2011), following systematic literature review procedures. When writing about the factors determining competitiveness, Porter (2017) draws a structure based on three dimensions: Endowments, Macroeconomic Competitiveness and Microeconomic Competitiveness.

In the literature, the dimensions of competitiveness will be decisive for investigating competitive advantages, whether of firms or nations (Porter, 1998). By carrying out bibliometric research based on the dimensions of competitiveness and not the elements of the diamond model (Porter, 1998), the aim is to provide a comprehensive view of the competitiveness of the maritime clusters covered in the literature, whether in the national dimension or in the micro competitive dimension. The selection was carried out to verify an overview of the bibliographical approach, whether produced macroeconomically or from a microeconomic aspect.

Analyzing the plurality of approaches to maritime clusters, the variation in publication means and the geography of their origin guided this research, which has the following starting question: What are the main dimensions of competitiveness that have been addressed in the literature on maritime clusters? ? Thus, this research aims to consolidate the competitiveness variables relating to maritime *clusters* present in the strategy and competitiveness literature.

Updating systematic analyzes using bibliometric techniques such as that carried out in Wang et al (2016) is the main objective of this text, in addition to consolidating the research in three databases, with comparative analysis between them, since previous studies mainly limit based on the Web of Science database (Santos Natário, Pereira et al, 2023; Wang et al 2023).

Highlighting which dimensions have received the most attention in the literature and which is the main research unit presented is also the objective of this research. The research contributes to the literature by adding an intersectional perspective on the characteristics of maritime *clusters* and favors, for all regional development based on the maritime economy, the essential factors of regional development that must be present to guarantee economic and sustainable growth.

2.Method

2.1 The databases searched

This is a systematic literature review, of a theoretical, exploratory and qualitative nature, based on the text by Stravroulakis, Papadimitriou & Tsirikou (2021) that will search in comparative literature for the factors and elements highlighted as dimensions of competitiveness of maritime clusters.

The following research repositories will be used: Ebsco, Scopus and Web of Science to search the literature for publications on experiences already mapped in maritime clusters. As it seeks to contribute to the literature, it will use the same bases already presented in previous studies (Selvaduray et al, 2022; Fiskin & Cerit, 2020; Santos Natário, Pereira et al, 2023; Wang et al 2016;Wang et al, 2023), expanding the research approach, unifying the three main databases in a single work.

The Scielo platform was excluded from the research because it presents some references already mapped by the first two and, above all, because it collects mainly Latin American journals, where the reality of maritime clusters does not present numerical robustness in the publications.

2.2 Application of bibliometric techniques

a) Quantitative and source analysis of publications

The searches were carried out in the databases between February and May 2023, and, initially, only the expression Maritime Clusters, in English, that is: “Maritime Clusters”. The databases of content focused on the area of Health, as well as those related to Computer Science, even available on the platforms searched, were extracted from the search that aims to prioritize the themes of Social Sciences, Strategy and Competitiveness.

With these results, the first bibliometric analysis was carried out, which presupposes quantifying academic production in maritime clusters in the area of Strategy, Economy and Administration in the main scientific research repositories, considering the last 10 years (2012-2022), providing a longitudinal study to the diagnosis of the increase in interest and academic publication over time.

The main technique at this stage will be performance analysis, especially with the total number of publications per year, in addition to the origin of the publications, and the main publication journals.

b) The search plan and the matrix of keywords by competitiveness dimension

In the second stage, the bibliometric technique of division by content will be applied, considering the sample obtained from the performance analysis. The scientific mapping technique of bibliographic coupling is adopted.

At this stage, titles, summaries and keywords of the researched articles were considered, combining content analysis with the analysis of the occurrence of searched terms, in order to couple them between the dimensions of competitiveness.

The order in which texts are presented does not follow hierarchy, or number of citations, but rather the order of entry of references/keywords searched from the search results.

Table 1: Search plan and division of competitiveness dimensions

Dimensions of Competitiveness	Related Subjects	Keywords searched
Feedstock	Natural resources; Geographical location; population; Land area	Natural resources; Natural Environment; Environmental; Geographical location, Geographical; population and land area
Macroeconomics of Competitiveness	Monetary policies Tax Policies Human development Effective Public Institutions	Monetary policies; tax policies; policy; economy; Human development; urban economy; Effective Public Institutions;Public Authorities; stakeholders
Microeconomics of Competitiveness	Quality of Business Environment State of cluster development Sophistication of Company Operations and Strategy	Quality of business; Business Environment; State of cluster development; Sophistication of Company; Operations; Strategy

Source: Prepared by the author. Based on Porter (2017)

The bibliometric analysis was based on Donthu et al (2021) which suggests a rigorous method in bibliometric analysis, even applied to the area of management. A good bibliometric analysis provides scholars with "(1) obtaining a complete overview, (2) identifying knowledge gaps, (3) obtaining new ideas for investigation, and (4) positioning their intended contributions to the field" (p.285).

Content analysis allows us to go beyond merely quantitative analysis, it allows us to analyze the emphasis of content covered in the literature, allowing articles to be classified in each dimension of competitiveness.

To analyze the results, such as enrichment techniques or network analysis, visualization metrics were used with the use of the Word Art generator application software to provide a better presentation of the investigated data. The formation of word clouds was used here as a complementary technique to the analysis theme (Vilela, Ribeiro, Batista, 2020) as a content analysis tool given the sample of references for each dimension of competitiveness, for each platform researched. The purpose is, based on the frequency of the lexicon, to demonstrate the most used terms in bibliographic references, mainly titles of articles researched in each area researched. Other software were considered, such as Iramuteq, but the plurality of the database made their use unfeasible.

3 Results

The results were divided by platform to, in the end, arrive at joint results regarding the number of publications, main journals, geographic origin of publications and division based on the type of competitiveness dimension. Content analysis was initially carried out using the equivalent keyword, followed by content analysis using the title and summary of publications. The full version of this text will present the results by search platform. Although, at the next session the main results will be discussed within the analysis for all three databases.

4. Analysis and discussions

For the Ebsco platform, of the 158 references found for the applied parameters, 27 articles (17%) were identified as dealing with natural resources, 25 with macroeconomic aspects (15.8%) and 14 with microeconomic aspects of competitiveness (8%).

In Scopus, of the 284 references from searches for maritime clusters, 72 articles were selected for the natural resources factor (25.3%), 82 (28.87%) for macroeconomic aspects and 81 (28.52%) for microeconomic aspects.

For Web of Science, with 1285 occurrences of texts on maritime clusters, the most expressive collection on the subject among the platforms investigated, 117 deal with natural resources, corresponding to 9.10%, 156 articles on macroeconomic aspects (12.14%) and 132 (10.27%) to microeconomic aspects.

Macroeconomic aspects are more covered in the literature on maritime clusters for the Scopus and Web of Science platforms, while on Ebsco the content of natural resources is prevalent.

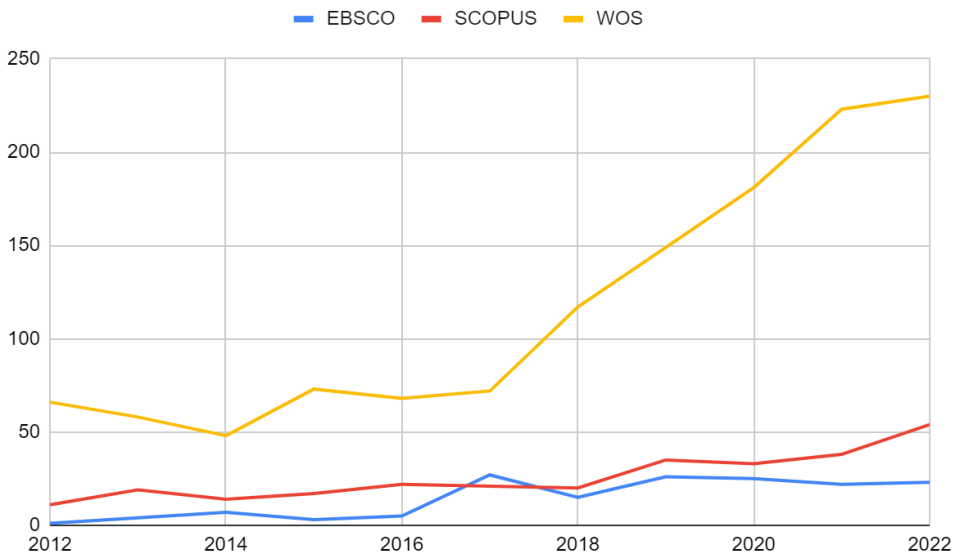
It is clear that there are works in the results searched for Maritime Clusters that do not present the keywords used as search parameters.

It is important to highlight that the databases researched are presented as generic search repositories, and Web of Science compiles several databases, which justifies the much more expressive result than other platforms. Searching in generic databases works for provide broad visibility in research on the topic and how literature has behaved in various areas of knowledge.

The search went through a first keyword filter for the content of maritime clusters and then segregated again by competitiveness factors based also on keywords and content analysis contained in the titles and summary.

Regarding the amounts of publication over time, graph 1 presents in a unified way the number of publications on maritime clusters in the years 2012-2022, where the “y” axis represents the number of articles indexed on each platform and the “x” axis ” the temporal evolution of publications.

Graph 1: Evolution of Publications on Maritime Clusters (2012-2022)



Interest in the topic is growing in the three repositories investigated and, despite the number reducing in the last year of the Ebsco platform sample, considering the entire period analyzed, interest in the topic is growing.

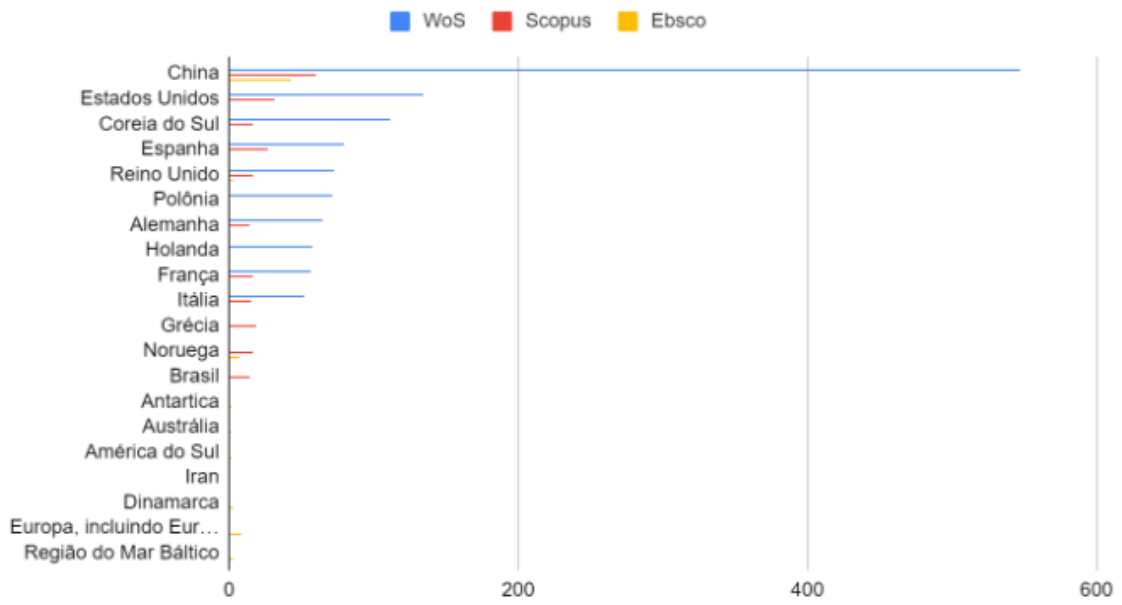
Searching on the Ebsco platform, which has quality articles licensed by publishers and, in the search carried out, published in peer-reviewed academic journals, it is possible to notice, in the first analysis, the growing interest in the topic, and the most recurrent publication over the years. years. The years 2017 and 2019 presented the largest numerical quantity of these publications.

In Scopus, small drops are noticed in 2024, 2028 and 2020, but, like the others, considering the complete sample, interest is growing in the topic, reflecting the growth in publications.

In none of the platforms researched were the total results, and the upward curve of publications on the topic, as evident as the Web of Science. The constant technological update provided by *Clarivate Analytics* and the search for indexing on this platform to be among the impact factor research can justify the numerical disparity between the databases and also that the references searched on previous platforms, in large part, present also in the search carried out in this database.

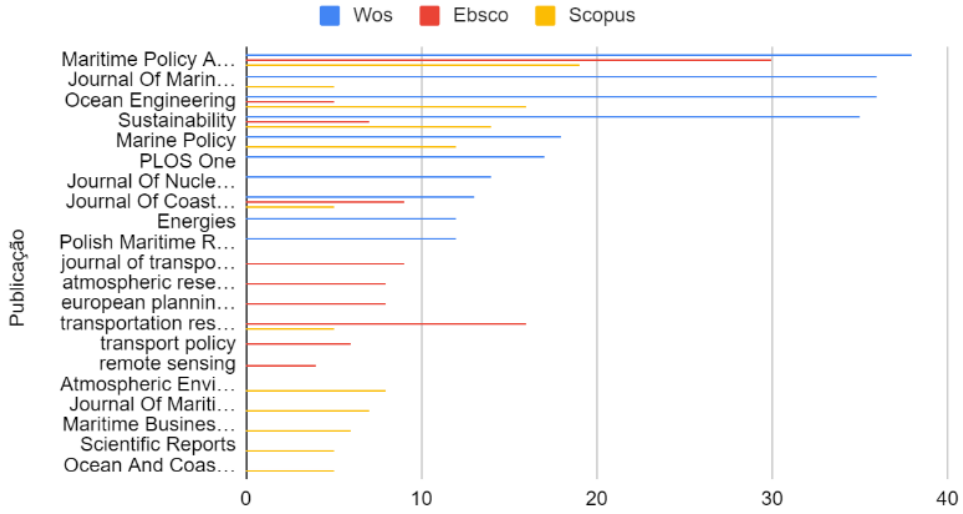
Regarding the origin of the publications, Asia is, disproportionately, the main source of publications, many of them focused on case studies of the ports themselves and interactions between clusters. South America draws attention with a timid representation, and the articles do not exactly deal with maritime clusters from a management point of view, but rather based on the biology and genetic variation of Antarctic populations (Andreev et al, 2022; Biersma et al, 2020).

Graph 2: Geographic Distribution of Publications on Maritime Clusters (2012-2022)



This data deserves to be highlighted because, in the bibliometric analysis carried out by Fiskin & Cerit (2020), considering the period 1975 - 2018, Asian publications, whether from the Republic of China (2nd place) or Korea (10th place) show greater growth than any other. Considering the geography of the places studied, Li & Luo (2021) reinforce that Europe was the predominant location in the 20 years studied, however Asian studies, especially Chinese, have been gaining prominence in the study of maritime clusters.

Graph 3: Main Journals with Publications on Maritime Clusters (2012-2022)



In frequency-based content analysis (Bardin, 2006), it is possible to assemble word clouds with the main occurrences of each competitiveness dimension. With the intersection of the competitiveness dimensions in the three platforms studied, it is possible to verify the preponderance of themes based on frequency of word exploration, repeating the methodology above, but now presented by factor, for the three platforms.

Table 1: Frequency analysis of competitiveness factors Scopus, Ebsco and Web of Science

Natural resources	Macroeconomics of Competitiveness	Microeconomics of Competitiveness
		

Source: Research data. Prepared by the author

Ports are the main units treated in the literature, which gives them an undeniable role in the formation of the cluster and when dealing with the literature on maritime clusters. The emphasis on the term "case", with 31 occurrences for natural resources, 38 for macro aspects and 27 for micro aspects, shows that the literature recurrently explores case studies and geographic locations, which are mainly concentrated in China (Zhang, Asi et al., 2019;Han, Yi et al, 2022,Wan, Shul in,et al, 2020), and the European oceans such as the Italian Maritime Cluster (Rupo, Daniela et al., 2018), London (Zhang, Wei; Lam, Jasmine Siu Lee, 2017); Norwegian Maritime Sector (Agnete Hessevik, 2022); Estonian Maritime Sector (Branten, Eva & Purju, Alari, 2014); and other European maritime regions (Vicente-Cera, Isaías et al, 2020). The recurrence of the expression "model" can reinforce this point of observation. The aforementioned absence of Latin American ports or cases in the literature is notable.

In the analysis of natural resources, in addition to the frequency of terms related to cases and ports, already mentioned above, ships (36 occurrences) and the environment (34 occurrences of the term "environmental" and 11 for "environment") are the next more frequent references.

In the frequency analysis of texts that reflect macroeconomic aspects, "Politics" is the most recurrent expression, but it is important to mention that the term is in the name of most periodicals, and the frequency analysis was based on complete references. Once again, the most frequent words date back to the case study (38), with emphasis on industry (22 occurrences), Economy (25 for the term "economy" and 39 occurrences for "economic") and sustainability (28). It is also possible to assess the literature on development (31) Regional (31) in macroeconomic aspects.

As for the texts produced in the literature related to the Microeconomics of Competitiveness, it is in this factor that ports stood out most (121 occurrences), as well as ships (89) and transport (89), which means that operations in the main research unit of maritime clusters, which are ports, are of great interest in the literature. Management elements (Management, 92 occurrences) also gain greater prominence in this factor studied.

Innovation, governance, circular economy and recycling are themes presented more recently in the literature, and can be identified as a trend in the production of literature on maritime clusters.

Final considerations

The era of the oceans declared by the UN, the development of technologies and the exploration of Offshore resources leads to a growing approach in the literature to economic and environmental issues regarding maritime resources.

Studying the maritime economy, responsible for a large part of the movement of nations' wealth in isolation in each area of activity, does not allow for the integrated vision that business clustering provides, even though the relevance of each individual area is recognized.

As a competitive regional development strategy, however, the clustering of maritime businesses proves to be the most effective way of studying and analyzing the frequency in the literature of this area of industrial business, reinforcing the concern and attention to this business segment.

The quantity and increase in publications reflect a genuine concern, which is addressed in the literature but also experienced in practice, with the recent institution of public policies that use the dynamics of cluster interrelationships as development strategies (Yang et al, 2022; Gifford ,McKelvey & Saemundsson, 2021; Yin, Fan & Li, 2018).

In the analysis of the periodicals, those specialized in policies, management and maritime transport reflect this relevance in the study of business clustering, being, like those on sustainability, geography and engineering, the vehicles with the highest volume of publications over time. The finding reflects that, within the field of specialization, clustering literature has occupied relevant academic spaces, which reinforces the proposal to study the business based on this literature.

The origin of the research is predominantly Asian, followed by European studies, which leaves a lot of comparative literature for Latin America and other regions, but, in the case of regions with different economic performances, it is important to understand this gap in the literature and the investigation of reasons that favor the literary hiatus of South American and African maritime clusters, for example. In the business dynamics, they are important partners in the transport of goods and passengers from Asia and Europe, which expand their commercial activities, especially maritime ones, to these continents, even though they are not portrayed in the literature.

If the case study is prevalent in the literature, it is clear here that case studies from the southern hemisphere are not making up the main databases.

The division by competitiveness dimension allows a more detailed analysis of business and institutional efforts to develop the maritime cluster, and which concerns are most frequent in each area. It is also true that port operations are the main research units and environmental sustainability is the main concern in the literature. These two themes will be present in all dimensions investigated, and apply to the use of oceans, coastal areas, innovation and technology of ship fleets and, above all, the economic results of clusters.

In what this article contributes to the literature, it is important to highlight that, among the dimensions of competitiveness, what generates the most repercussion in the literature are not natural resources, but macroeconomic aspects, which reinforces the fact that economic clusters are studied as an element of the regional economy of competitiveness and geography of regional development, after all, both in the literature and in relation to cluster development, the availability of public policies, labor, and political and fiscal stability are of interest for regional development.

As a limitation of the research, the stratification of literature by competitiveness factor, not considering the time frame but rather the entire sample period investigated (2012-2022), generates an inaccuracy in the evolution of behavior in the publication of each subject.

It is suggested for future research that the articles that appear portraying all dimensions of competitiveness organized in this work be analyzed together and compared with each other in order to verify the convergence of competitiveness strategies considering each of the dimensions. It is also suggested to map the Clusters explored in the bibliography by region and

prepare a technical document that compares the movement capabilities in order to analyze the possibility of a comparative study between the realities already studied.

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