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ORIGIN, CONCEPT, AND TRENDS OF THE BLUE ECONOMY

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ORIGIN, CONCEPT, AND TRENDS OF THE BLUE ECONOMY

Abstract

Objective: this paper presents the state-of-the-art on the Blue Economy (or Blue Growth) covering 28 years of scientific literature. **Theoretical Framework:** We used the blue economy concept used by the United Nations as a guide to conduct a systematic literature review. **Methods:** we did a Systematic Literature Review in 20 scientific databases, considering two search terms in three languages: English (“Blue Economy” and “Blue Growth”), Portuguese (“Economia Azul” and “Crescimento Azul”), and Spanish (“Economía Azul” and “Crecimiento Azul”). **Results:** The preliminary search found 2,817 papers, which were reduced to 371 papers after cleaning the data. It allowed us to show a publication map on the topic per database, per journal, the number of authors per work, the main studies methods, and data collection techniques. After that, we group the papers into semantic categories, and that led us to seven thematic axes: public policy, ocean and coastal sustainability, blue energy, innovation and technology, aquaculture, tourism, and critical studies. **Conclusions:** this paper presents that the Blue Economy is a topic of growing interest, but that is still being structured in the scientific literature.

Keywords: blue economy; blue growth; ocean and coastal economy; sustainability; systematic literature review

INTRODUCTION

The bases for what would come to be the so-called Blue Economy were laid in the context of the United Nations Conference on the Environment and Development, also known as ECO-92, which took place in Rio de Janeiro in 1992 (Chua, 2013; Eikeset *et al.*, 2018; Grip, 2013; Neumann, Ott, & Kenchington, 2017). At the meeting, some countries realized that it did not make sense for them to talk about the Green Economy, so these Small Island Developing States (SIDS) warned to broaden the debate in order to have greater representation. The participation that marine and coastal resources play in the economy of these island countries is considerably more significant than the economy based on the terrestrial environment (Michel, 2016). In addition, the greater economic, environmental and social vulnerability of island countries concerning climate change showed that this group of countries would first perceive a catastrophic scenario. Thus, even during Rio-92, we noticed that adhering to a Green Economy proposal could not be charged in an identical way among all nations (Eikeset *et al.*, 2018; Grip, 2017).

Later, the importance of the Blue Economy has transcended the reality of Small Island Developing States and has become an agenda of global interest. Consequently, debates around the role of the oceans and coastal environment for sustainable development have been intensified by academics, policymakers, civil society, and Non-Governmental Organizations (NGOs), as well as the private sector and other stakeholders (Voyer, Quirk, Farmery, Kajlich, & Warner, 2021).

Given the importance that the Blue Economy has received since then, a growing number of studies have been published seeking to shed light on a more sustainable relationship with the oceans and coastal environment (Kabil, Patriatmoko, Magda, & Dávid, 2021; Lee, Noh, Lee, & Khim, 2021). However, these studies point to multiple directions, making the Blue Economy a term that covers themes that are sometimes very different from each other. In seeking to compile this information, this chapter sought to identify, synthesize, and interpret the state-of-the-

art Blue Economy research using a systematic literature review. A period of 28 years was considered, taking into account the term's appearance for the first time in 1992 until the end of 2020, covering 20 national and international scientific databases.

Thus, the objective was to survey the state-of-the-art scientific articles directly or indirectly linked to the term Blue Economy (or its correlate Blue Growth) through a systematic literature review. The specific objectives of this survey are a) To build a repository of existing thoughts on Blue Economy and its development in order to offer a resource for current and future researchers on the subject, based on bibliometric research; b) Show the main methodological models, data collection techniques and types of analysis used in research on Blue Economy; and c) Present the main approaches given to the Blue Economy by the interested parties, its development and discovery, as well as present the existing criticisms of this sustainable development model, based on the thematic analysis. Therefore, the aim is to present a perceptual map of the debates related to the theme and contribute so that new studies have access to a synthetic collection of the theme.

Blue Economy or Blue Growth

Given the heterogeneity of adopters of the term, it is natural that the concept may represent different issues for each of them, in such a way that it is still possible to have dissonance in the way each author perceives the concept of Blue Economy (Silver, Gray, Campbell, Fairbanks, & Gruby, 2015). However, some previous researches have tried to answer some questions that can contribute to the understanding of the theme, such as which key concepts are used by geography researchers working in Blue Economy (Garland, Axon, Graziano, Morrissey, & Heidkamp, 2019); concepts related to sustainable innovations or theories on this topic (Cillo, Petruzelli, Ardito, & Del Giudice, 2019); studies that make a critical onto-epistemological review of the literature on marine space planning (Fairbanks, Boucquey, Campbell, & Wise, 2019); or sustainable growth based on the Gross Domestic Product (Raworth, 2019), as well as studies that analyze the theme from a post-structuralist perspective (Bear, 2017). Thus, although one cannot yet speak of consensus, a prudent step would be to understand the concept and, further, understand what Blue Economy is not (Garland *et al.*, 2019).

What Blue Economy is not

One of the first issues that can lead to a different concept of Blue Economy adopted in this study is using the terms Blue Economic and Blue Growth as a synonym for the conventional concept of Sea Economy. Although this difference may seem subtle and harmless, it ends up bringing an omission of the sustainability proposal intrinsic to Blue Economy and, as a consequence, can induce researchers, public policy promoters, civil society, and other practitioners to misunderstand the actual proposal of the concept or even about which directions must be taken.

The second point to be clarified is the use that the Belgian writer and speaker Gunter Pauli has been making of the term Blue Economy. Pauli (2010) uses the term Blue Economy to refer to a business model based on the growth of the Circular Economy as an effective alternative for sustainable economic development. Such a model appears as a response to the realization that the Green Economy touted in past decades did not materialize in a more sustainable planet.

For Pauli (2017), the concept of a Blue Economy comprises a totalizing narrative based on the notion that if the ocean, sky, and Earth are blue, the idea of a Green Economy no longer meets the sustainability proposal. In such a way, while for Pauli (2010), the Blue Economy represents a metaphor to refer to a business strategy, for this paper, the Blue Economy refers

specifically to the sustainable use of the oceans, seas, and coastal environment. Therefore, although the Blue Economy in Pauli (2010) is not necessarily in conflict with the Blue Economy presented in this article, we decided to exclude works that use the expression Blue Economy from the perspective of Gunter Pauli.

A third point, no less important, is that by Blue Economy, we only mean issues related to the humid environment and its surroundings. Since there is a direct correlation between ecosystems, dissociating sustainability in soil from sustainability in a humid environment turns out to be a reductionist view of the whole. For example, the destruction of river sources and riparian forests reduces the flow of water in a river and, therefore, the sea ends up invading and destroying the mangroves near its mouth.

Finally, the Blue Economy does not correspond to a calcifying concept but is more referred to as a set of projects and actions to promote the correlation between sustainability and the blue environment. In other words, even if empirical studies or activities do not directly mention the concept, it can be part of it insofar as there is some degree of stimulation to a simultaneously sustainable and productive ocean at a local, regional, national or global level.

METHOD

The method procedures followed three steps in order to reach the proposed objectives. Initially, a bibliometric analysis was carried out, followed by systematic analysis and, finally, a thematic analysis with the selected articles. A detailed description of the route adopted will be presented below.

Descriptive bibliometric

This study is characterized as empirical-analytical research, whose approach can be considered descriptive. Descriptive surveys are noted for being well ordered with the explicit objective of either solving problems or assessing alternative courses of action and formal procedures. The literature survey started with the Scopus database. It was later extended to 19 other databases, namely: Science Direct, Springer Link, Sage Journals, Emerald Insight, Wiley Online Lib, Metadex, PubMed Central, Oxford University Press, Aerospace Database, Sociological Abstract, Materials Re-search Database, Materials Business File, Journal RSC (Royal Society of Chemistry), Materials Science & Engineering Database, Engineering Materials Abstract, AGRIS (United Nations Food and Agriculture), ANTE (Abstracts in New Technology and Engineering), Nature and SPELL (Scientific Periodicals Electronic Library).

The expressions “Blue Economy” and “Blue Growth” are commonly used synonymously in the literature (Carver, 2020; Childs, 2020; Hoerterer *et al.*, 2020; Rilov *et al.*, 2020; Said & MacMillan, 2020) to describe, in many cases, the same phenomenon, which justifies the choice of these search terms for the present research. Thus, to be more inclusive in the searches, these terms were considered in English “Blue Economy” and “Blue Growth”, in Spanish “*Economía Azul*” and “*Crecimiento Azul*” and in Portuguese “*Economia Azul*” and “*Crescimento Azul*”. The search was done with a Boolean operator (quotes) to increase the accuracy of the searches and avoid dispersion (O’Donnell, 2014). The objective was to find scientific articles and leading researchers related to the subject of study with publications in the main languages.

Other search filters were the search for keywords in the title, abstract, and keywords of the works and only peer-reviewed journals; that is, the so-called gray literature was excluded (book chapters, conference proceedings, and conferences, among others) (Campitelli & Schebek, 2020; Custódio, Villasante, Calado, & Lillebø, 2020; Khosravi, Newton, & Rezvani,

2019). Thus, for each search in each language, two rounds were carried out, totaling six rounds of a search for the keywords.

Systematic analysis

To Loviscek (2021), a systematic literature review is essential for researchers who seek to study problems or phenomena rationally. This methodological procedure is an important step that allows the researcher to understand one or more concepts about the subject of study, enabling new knowledge, structures, and development of theories and guidance and pointing out new gaps for future research.

In this sense, the objective of the systematic review is to specify, measure, and synthesize all relevant studies through an objective, transparent and replicable process for new researchers and future studies (Khosravi *et al.*, 2019; Loviscek, 2021). Thus, the search, analysis, acceptance/rejection guidelines of the bibliography consulted in the databases for this systematic literature review followed the PRISMA technique (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) (Campelli & Schebek, 2020; Moher, Liberati, Tetzlaff, & Altman, 2015). The methodological procedures followed the proposals by Campelli and Schebek (2020), Custódio *et al.* (2020), Khosravi *et al.* (2019), and Loviscek (2021).

Considering that the Blue Economy encompasses several political, socio-cultural, economic, and environmental issues for the sustainable development and management of oceans and coastal environments and that the proposed objectives do not include a detailed analysis of the themes resulting from the research, we applied a variety of systematic review that involves assessment based on synthesis and interpretation and combines best practices in evidence-based management (Macpherson & Holt, 2007; Thorpe, Holt, Macpherson, & Pittaway, 2005) with inductive methods of thematic analysis used in qualitative psychology (Braun & Clarke, 2006). Therefore, the systematic review process begins with a comprehensive literature search followed by the thematic analysis of the dataset.

It is worth noting that the systematic analysis was carried out at two different times to achieve specific objectives 2 and 3. Initially, an analysis was carried out on the methodological aspects that address the subject of study in order to understand how the researchers are working on the methodological perspective of research. This step sought to identify, from the reading of the selected texts, the authors' primary methodologies, data collection techniques, and types of analysis. This type of analysis is essential for revealing the primary epistemic and methodological fields in the construction of theory and praxis of research in Blue Economy in order to guide future researchers in this field. It is noteworthy that a detailed reading of the "methodology" section of all 371 studies selected to achieve specific objective 2 was carried out. Item 2.4 presents the results of this stage.

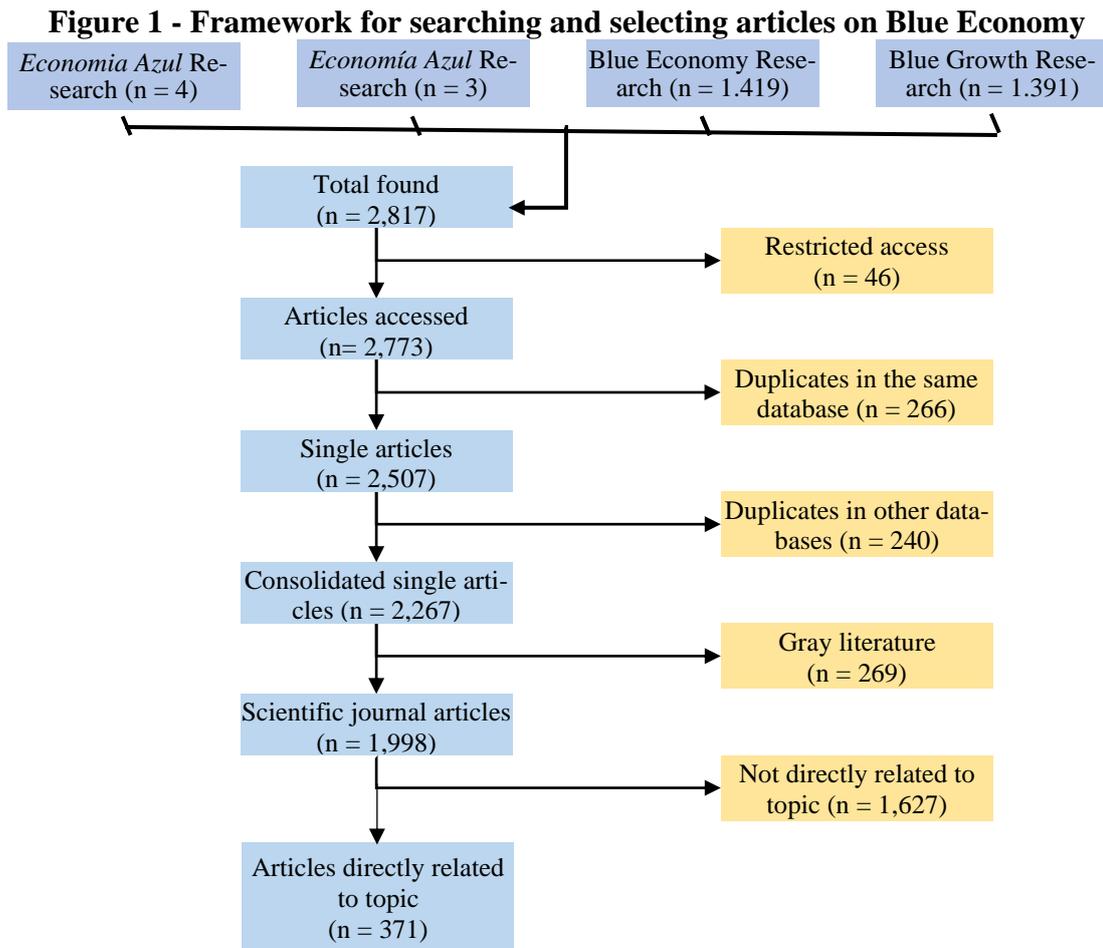
In the second moment, an analysis was carried out on the main themes addressed by the authors in their respective works. It should be noted that, in the systematic review, the themes (as a result of the investigation) represent the fundamental concepts used by the author to discuss the subject of the article (Ryan & Bernard, 2003). In other words, themes are, in essence, the central ideas and conceptual arguments that address the issues, constructs, and concepts used in researching an article (Thorpe *et al.*, 2005). Therefore, these themes emerged from the holistic understanding of each article analyzed. The justification for using this approach lies in the fact that the Blue Economy may be implicit in the proposal of the studies, given its broad scope. Item 2.4 summarizes the results of this analysis.

RESULTS AND DISCUSSION

This section item presents the main results found and is structured as follows: at first, the statistical and descriptive results from the bibliometric analysis are presented; secondly, a systematic analysis was carried out in order to identify the primary epistemic and methodological fields in the construction of theory and praxis of research in Blue Economy; and, in the third moment, the results from the thematic analysis are presented, listing the main research themes and action strategies that involve Blue Economy in the search languages.

Descriptive bibliometric analysis

In total, 2,817 articles were accounted for. As for the search terms, the terms “*Crescimento Azul*” in Portuguese and “*Crecimiento Azul*” in Spanish did not present any study. The term “*Economia Azul*” resulted in four articles in Portuguese, while three were found in the search with “*Economía Azul*” in Spanish. Mainly, the results occurred in the search with the terms “Blue Economy” (n = 1.419) and “Blue Growth” (n = 1.391) in the searched databases. In this sense, it should be noted that, even though the searches were carried out in these three languages, three articles were found in Mandarin and two more in Russian, which were excluded during the analysis phase. This is justified because the abstracts of these works were in the English language, generating a false positive in the searches. Figure 1 shows the framework used in the research to search and select articles.



Source: Designed by the authors.

These studies were analyzed following selection/exclusion criteria such as duplicated works in the same database (n = 266), duplicated works in other databases (n = 240), articles

with restricted access (n = 42), and articles seen as gray literature (n = 269). We should mention that the next step comprised the critical reading and analysis of the abstracts and conclusions of the articles (n = 1,998) where texts that use the term “Blue Economy” with a meaning different from the scope of this paper were excluded, such as the one used by Pauli (2010) (76), as well as studies that only mention the term in the article corpus, but whose work itself does not deal with the theme Blue Economy (1551). From this phase, 371 articles directly connected to the theme were selected. Table 1 shows the total number of articles selected in each database considering the period analyzed.

Table 1 - Articles selected in the databases in the period analyzed

DATABASE	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	TOTAL
Scopus	1	-	2	3	17	16	23	42	80	61	245
Science Direct	-	-	2	5	1	13	7	14	22	22	86
Materials Science & Engineering Database	-	-	-	-	1	2	-	1	1	9	14
Oxford University Press	-	-	-	-	-	-	2	-	1	-	3
PubMed Central	-	-	-	-	-	-	2	-	1	3	6
Wiley Online Lib	-	-	-	-	-	-	-	2	1	-	3
Materials Business File	-	-	-	-	-	-	-	1	-	-	1
Metadex	-	-	-	-	-	-	-	-	1	1	2
Sage Journals	-	-	-	-	-	-	-	1	-	1	2
Springer Link	-	-	-	-	-	-	-	1	-	-	1
Aerospace Database	-	-	-	-	-	-	-	-	-	-	0
AGRIS (United Nations Food and Agriculture)	-	-	-	-	-	-	-	-	-	-	0
ANTE (Abstracts in New Technology and Engineering)	-	-	-	-	-	-	-	-	-	-	0
Emerald Insight	-	-	-	-	-	-	-	-	-	-	0
Engineering Materials Abstract	-	-	-	-	-	-	-	-	-	-	0
Journal RSC (Royal Society of Chemistry)	-	-	-	-	-	-	-	-	-	-	0
Materials Research Database	-	-	-	-	-	-	-	-	-	-	0
Nature	-	-	-	-	-	-	-	-	-	-	0
Sociological Abstract	-	-	-	-	-	-	-	-	-	-	0
Spell	-	-	-	-	-	-	-	-	-	-	0
TOTAL	1	0	4	8	19	31	34	62	107	97	363

Source: Designed by the authors.

According to Table 1, the databases with the largest repository of work that cite the search terms are Science Direct (960), Materials Science & Engineering Database (556), and Scopus (498). However, after applying the filters to Scopus, the most significant number of selected works was obtained as it was the first database analyzed. In this sense, it is essential to highlight that although some databases listed in Table 1 do not present selected articles in some cases, some of these studies are duplicated in other databases and deal with Blue Economy or Blue Growth and therefore present relevance. It should also be noted that the SPELL database did not present any paper, which reinforces the scarcity of studies on the subject in Brazil. The 371 selected studies were published in 131 journals, as shown in Table 2.

Table 2 - Journals published on Blue Economy

Journal	IF ^a	SJR ^b	H-Index	Number of publications	% of publications
Marine Policy	3,228	1,355	95	80	22.04%
Ocean and Coastal Management	3,34	0,916	84	24	6.61%
Frontiers in Marine Science	4,44	1,558	49	18	4.96%
Sustainability Science	5,301	1,659	54	12	3.31%
Journal of The Indian Ocean Region	1,35	0,307	12	11	3.03%
Science of the Total Environment	6,551	1,795	244	8	2.2%
Dialogues in Human Geography	1,63	1,212	30	7	3.86%
Journal of Political Ecology	1,9	0,899	23	7	3.86%
Journal of Ocean and Coastal Economics	0,23	0,106	1	7	3.86%
Marine Pollution Bulletin	4,049	1,548	179	7	3.86%
Journal of Maritime Affairs	2,1	0,585	19	7	3.86%
Coastal Management	1,547	0,552	49	5	4.13%
Environmental Development	3,24	0,791	31	5	4.13%
Sustainability	0,71	0,234	14	5	4.13%
Journal of Cleaner Production	7,246	1,937	200	4	3.31%
Journal of Coastal Research	0,793	0,247	90	4	3.31%
Regional Studies in Marine Science	1,63	0,464	19	4	3.31%

^a IF (Impact Factor); ^b SJR (Scientific Journal Ranking).

Source: Designed by the authors.

The periodical that has published the most on the subject is Marine Policy, with 80 publications (22.04%). Then comes Ocean and Coastal Management, with 24 publications (6.61%), and Frontiers in Marine Science, with 18 publications (4.96%). We should mention that 65.65% of the journals published only one paper on the topic, and another twenty journals published only two papers. However, if on the one hand there is a discrepancy between Marine Policy and the other scientific journals that publish on the topic regarding the number of publications, on the other hand, the research showed that the dissemination of knowledge and interest in the topic had provided publications in journals from different areas.

Systematic analysis

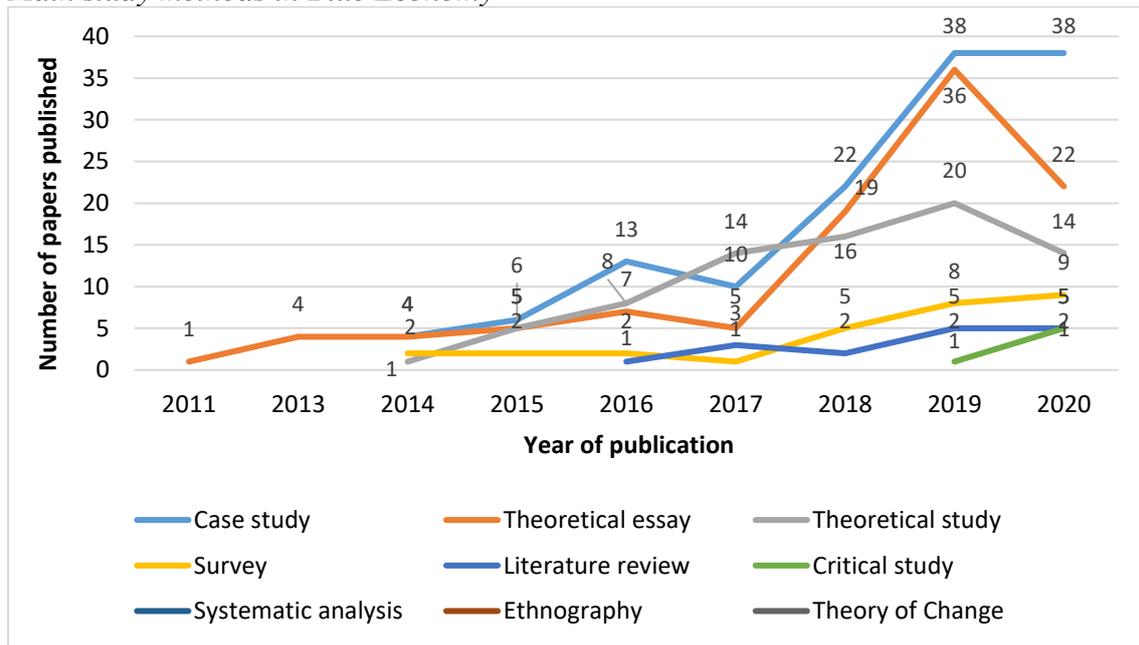
The analysis of the 371 articles showed that (single or multiple) case studies are the main methods used in research on Blue Economy. This is partly because researchers seek to understand territorial realities. There is greater urgency to implement sustainable actions at either local, regional or national levels, just as some researchers have developed a research framework and projects focused on specific environments and put them into action. In line with this perspective, there are also studies in which the survey methodology was used.

Here, it should be noted that some authors (Carver, 2020; Kaşdoğan, 2020; Rilov *et al.*, 2020) have already formulated critical studies on the strategies adopted for the exploration of ocean resources that are being promoted as Blue Economy actions but are not within this perspective (Chen, 2020). Strictly theoretical studies, that is, works that were limited to analyzing one or more themes only in the theoretical field or proposed research frameworks without empirical application demonstrated in the study, have also been configured as a research approach in studies about Blue Economy.

It was possible to identify many works focused only on discussing the frontiers of Blue Economy without investigating it empirically. These authors have sought to gather and discuss,

based on these studies, the paradigms and concepts that surround the theoretical/empirical field of Blue Economy in order to propose a universally accepted definition. Finally, we identified studies that used ethnography (Bogadottir, 2020; Okafor-Yarwood *et al.*, 2020), the Theory of Change (Granit, Lymer, Olsen, Tengber, Nömmann, & Clausen, 2017; Tirumala & Tiwari, 2020), and Q methodology (Gustavsson & Morrissey, 2019) as a methodology. As the field advances in publications, these results show that authors have sought different methodologies in studies on Blue Economy, given the multi- and interdisciplinary nature that the research field encompasses, both in terms of praxis and in theoretical and epistemological terms. Chart 2 shows the evolution in using the primary methods detected in studies on Blue Economy.

Figure 1
Main study methods in Blue Economy



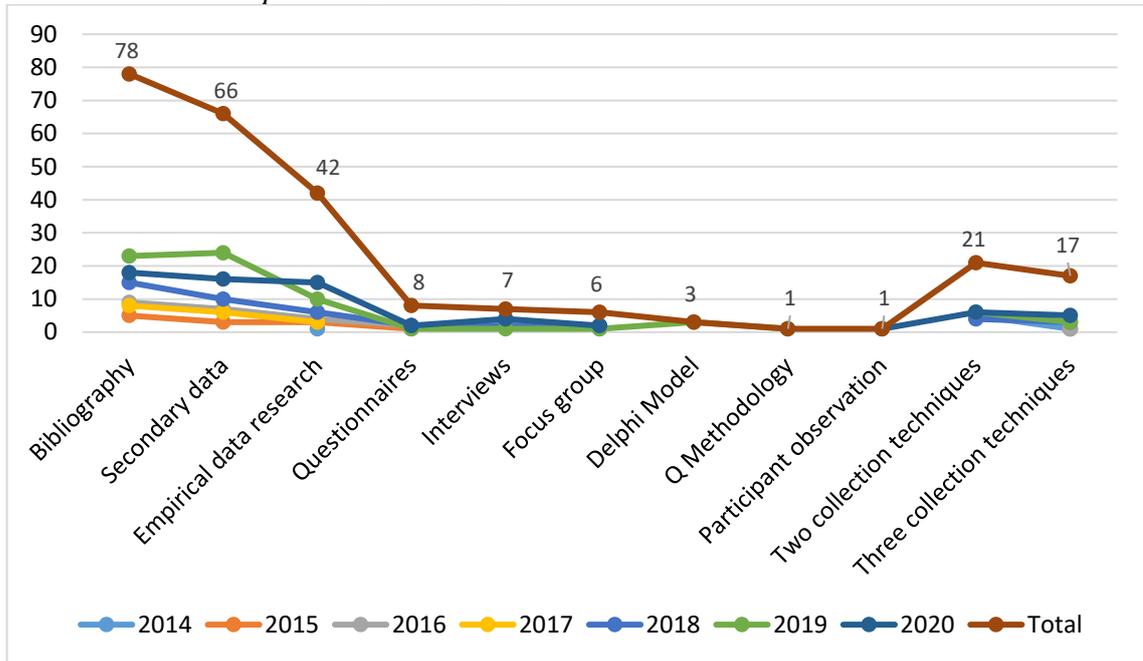
Source: Designed by the authors.

The results show that the authors have used more than one technique to collect empirical data in their research. The combination of two or more techniques is a reality among researchers which allows capturing the data in greater detail, making it possible to understand the reality, suggest changes and propose theories about the case studied. Among the techniques that are used simultaneously are the search for secondary data, interviews, questionnaires, focus groups, non-participatory observation, participatory observation, and ethnography.

Chart 3 shows the use of data collection techniques from the studies analyzed from the time frame:

Figure 2

Data collection techniques used in the studies



Source: Designed by the authors.

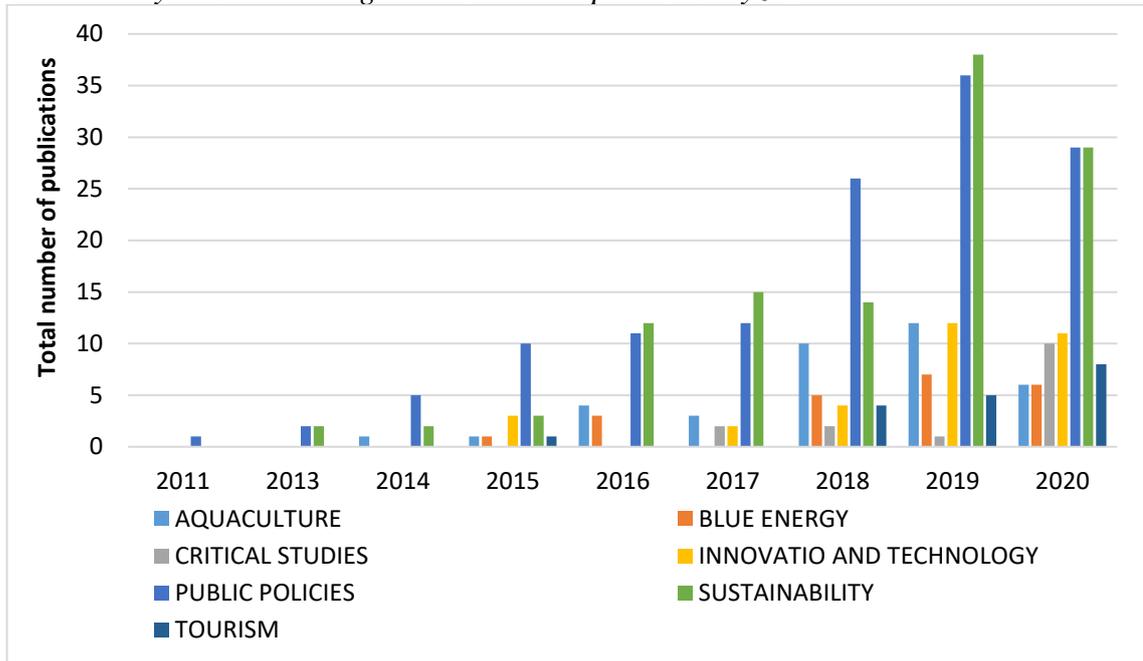
Finally, there is a slight superiority of studies that use qualitative analysis concerning quantitative analysis regarding the type of data analysis. This is due to methodologies and data collection techniques that require analysis of texts, discourses, and content with more subjective biases, contrary to statistical interpretations. In the same way as qualitative studies, the justification given by the authors for using joint analyzes (qualitative and quantitative) is that they can understand and describe with greater precision the object or reality being studied, considering the methodology and data collection techniques.

Systematic analysis of research topics

The selected articles were analyzed and grouped according to the semantic category criterion into rubrics, which was possible “due to the common characteristics of these elements” (Bardin, 2016, p. 147). These rubrics, called thematic axes here, emerged from seven major multi- and interdisciplinary themes (Philippi, Tucci, Hogan, & Navegantes, 2000) involving the research agendas of Blue Economy: public policies, ocean sustainability, and coastal environments, blue energy, innovation and technology, aquaculture (craft or industrial production), tourism and some critical studies from the perspective of Blue Economy. Next, each topic is presented in more detail. Chart 4 shows the distribution of works linked to the themes in the period analyzed, while Chart 5 shows the percentages proportional to the 371 selected articles.

Figure 3

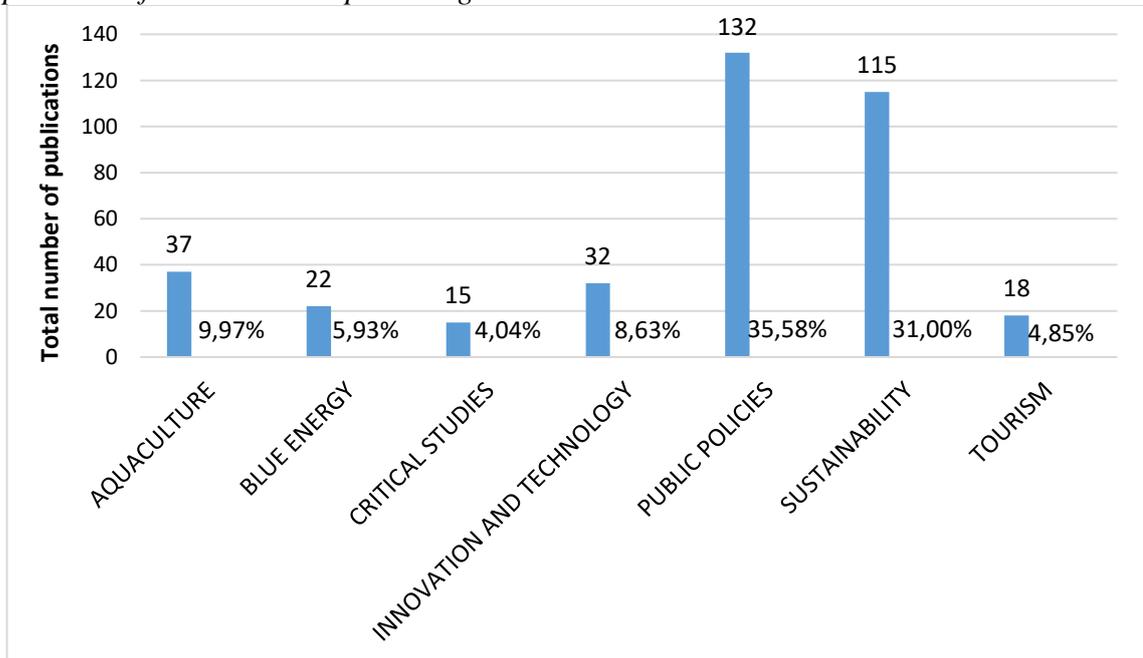
Thematic analysis in chronological order in the period analyzed



Source: Designed by the authors.

Figure 4

Importance of each theme in percentage terms



Source: Designed by the authors.

As illustrated in Chart 4, the year 2019 had the highest number of publications on Blue Economy/Blue Growth. The primary constructs discussed were “Sustainability” and “Public Policies”. In turn, Chart 5 shows the degree of representativeness and importance, in statistical terms, of the themes that emerged from the thematic analysis with expressive concern on the part of researchers/authors in debating and researching the phenomena inherent to the sustainability of the seas and oceans and, consequently, the public policies intrinsic to Blue Growth.

These two central themes occupy greater prominence in surveys, with 35.83% of the studies focused on public policy and 31% of the surveys dealing with the sustainability of marine and coastal environments.

We should emphasize that the themes emerged from the methodological procedures adopted (Campelli & Schebek, 2020; Custódio *et al.*, 2020; Khosravi *et al.*, 2019; Loviscek, 2021; Strauss & Corbin, 1998). However, this is not to say that these are not related. On the contrary, it is opportune to point out that these themes converse intrinsically as the authors advance and overcome methodological and epistemological barriers. The themes resulting from this step are presented in greater detail below.

Sustainability

According to Hossain, Gain, and Rogers (2020) and Kedia and Gautam (2020), about 10% of the world population live in areas less than ten meters above sea level, and 40% (about 2.4 billion people) live up to 100 km from the coast. According to Cawell *et al.* (2020), 17% of all animal protein consumed comes from the seas and oceans; about 80% of the products sold are transported by sea. Also, according to Cawell *et al.* (2020), in 2014, the oceans moved around US\$ 49.7 trillion, considering all activities (food, trade, transport, goods, and services). Van Hoof *et al.* (2019) projected that in 2050 the population should be ten billion people and that, if the current production and consumption model persists, natural resources, both terrestrial and marine, will be insufficient to feed the entire world population soon.

To Otero, Bayliss-Brown, and Papathanassiou (2019) and Klinger, Eikeset, Davids-dóttir, Winter, & Watson (2018), the cumulative result of this economic model has caused severe damage to the ocean environment, global warming, and, consequently, severe climate change. Clube and Tennant (2020) and Mohan, Dahiya, Amulya, Katakajwala, and Vanitha (2019) argue that, in this context, a rapid paradigm shift in production and consumption is needed. In this context, Cisnero-Montemayor *et al.* (2019) and Schutter and Hicks (2019) point out that the term “Blue Economy” has gained strength in several maritime sectors for seeking to harmoniously develop economic and socio-cultural activities in line with marine environmental preservation. It is a consensus in the literature that Blue Economy has as its primary objective the sustainable exploration of ocean resources for economic growth and development, respecting the social and cultural borders of coastal peoples, and preserving the ocean ecosystem.

In this sense, there is a consensus in the literature that blue growth can contribute to Sustainable Development Goals (SDGs), mainly SDG 14, as well as SDGs 1 and 2 (Dalton *et al.*, 2019; Harris *et al.*, 2018; Sarker *et al.*, 2018), SDG 3 (Custódio *et al.*, 2020), SDG 8 (Francis & Nair, 2020), SDG 12 (Frades *et al.*, 2020), SDG 16 (Witbooi *et al.*, 2020), and SDG 17 (Francis & Nair, 2020). Lee, Noh, and Kim (2020) and Obura (2020) found a direct correlation between Blue Economy and the United Nations’ SDGs, except for SDG 6 (clean water and basic sanitation) in the study by Lee *et al.* (2020).

However, Sarker *et al.* (2018) make an important observation: according to these authors, there is a concern about the accelerated growth of Blue Economy being able to incur, even more, in the increase of degradation of coastal and marine ecosystems. Howard (2018) reinforces this current of thought by showing that some countries have resorted to Blue Economy to develop global export markets for goods and services already being produced to obtain higher prices.

Public Policies

The complexity surrounding the sustainable management of oceans, seas, and coastal environments requires, on the part of the various actors involved, a comprehensive, integrative,

and coordinated approach in terms of policy, legislation, institutional arrangement, financial investment, management measures, support, and stakeholder participation (Bohle *et al.*, 2019; Chua, 2013; Lombard *et al.*, 2019; Van den Burg *et al.*, 2019). According to Hasller *et al.* (2019), Johnson *et al.* (2019), Li and Jay (2020), and Ntona and Schröder (2020), given the scope of ocean waters both nationally and internationally, the main difficulties in managing the oceans reside in the divergent legislation between countries or, even, in the lack of regulation.

In this perspective, Aschenbrenner and Winder (2019) and Gerhardinger, Quesada-Silva, Gonçalves and Turra (2019) state that the concept of Marine Spatial Planning (MSP) was widely promoted internationally as a political tool to minimize/solve the problems of ocean governance, initially implemented by local/regional authorities and, later, supported by the United Nations and the European Union. According to Ehler (2020), MSP also received other nomenclatures such as marine planning, ocean planning, marine spatial management, integrated ocean management, sea use management, marine zoning, and ocean zoning. However, it is about the same governance process of seas, coasts, and oceans.

To Gustavsson and Morrissey (2019), Karanad and Martin (2020), and Van Den Burg *et al.* (2019), the MSP's main objective is to create an inclusive and multisectoral structure (physical, legal, political, and supportive) that enables the development of socio-economic activities in oceanic and coastal environments, together with socio-cultural and environmental preservation. According to Finke *et al.* (2020), Hassan and Ashraf (2019), and Manea *et al.* (2020), MSP demands adequate institutional arrangements, including a comprehensive legal and political framework with adequate management tools and operational strategies. However, Penca (2019) and Voyer and Leeuwen (2019) draw attention to the fact that the private use of marine resources is legitimized by public policies endorsed by the Blue Economy.

Aquaculture

To Ahmed and Thompson (2019), the development of aquaculture in recent years is an essential part of the blue revolution, which, in turn, is an approach to increase the global production of fisheries resources in order to contribute to human nutrition and food security. Salas-Leiton *et al.* (2020) emphasize that the strategies for a Blue Economy require innovations that contribute to the sustainable development of aquaculture activity. We should mention that aquaculture is a broad term that encompasses various forms of production, such as algae production (Babier *et al.*, 2020; Ingle, Polikovskiy, Chemodanov, & Golberg, 2018), shrimp farming (Adeleke, Robertson-Andersson, Moodley, & Taylor, 2020; Ahmed and Thomson, 2019; Anna, 2017; Crona *et al.*, 2020; Custódio *et al.*, 2020), and fish farming (Adeleke *et al.*, 2020; Salas-Leiton *et al.*, 2020; Shava and Gunhidzirai, 2017).

Due to its diversified production, aquaculture has the potential to ensure food and nutrition security in a sustainable way (Davies *et al.*, 2019; Farmery, Kajlich, Voyer, Bogard, & Duarte, 2020; Grafeld, Oleson, Teneva, & Kittinger, 2017; Shava and Gunhidzirai, 2017), as well as generating economic development (generation of innovations, new economic activities such as ecotourism, optimization of activities and sectors of the economy already established such as the maritime transport sector, among others), sociopolitical (marine spatial planning, governance, networking between actors and segments, resolution of sectorial conflicts, empowerment, social inclusion, among others) and environmental (reduction in greenhouse gas emissions, food production in degraded areas, waste capture in the oceans, biomass and energy production, among others) from various countries and regions of the globe (Galparsoro *et al.*, 2020; Grafeld *et al.*, 2017; Kainge *et al.*, 2020; Link *et al.*, 2020; Outeiro *et al.*, 2020; Tsani and Koundiori, 2018). Therefore, as a productive sector, aquaculture is one of the main alternatives, from the perspective of Blue Economy, for the socio-economic development and environmental preservation of emerging countries, such as Brazil.

Innovation and technology

Innovation is at the epicenter of the Blue Economy (Wang and Xiao, 2017), so various innovations, whether social or technological, are expected to emerge in response to the Blue Economy (Upadhyay and Mishra, 2020). Because they are based on the economy of the sea, Blue Innovations are similar to eco-innovations, which are those innovations capable of producing environmentally sustainable products or services (Arranz, Arroyable, & Arroyable, 2020).

In this context, the Blue Economy strategy is permeated by promises of technological and innovative progress regarding socio-economic development and management of marine resources (Pudzis, Adlers, Pukite, Geisepele, Zeltins, 2018; Soma *et al.*, 2018) inclusively and sustainably. Pinto, Cruz, and Combe (2018) assert that the Blue Economy perspective drives the emergence and growth of emerging maritime industries such as blue energy, marine biotechnology, and deepwater natural resource mining and revitalizes traditional sectors such as aquaculture, maritime transport, and coastal tourism. However, the same authors stress that the learning process that generates innovations is concomitantly complex, cumulative, and heterogeneous and varies over time, with the type of industry and country to which it is related (Pinto *et al.*, 2018).

In turn, innovations in biotechnology have been growing in recent years. Biotechnology can, for example, contribute to reducing the greenhouse effect with carbon sequestration - blue carbon - (Contreras and Thomas, 2019), minimizing the environmental impacts of the industry (Anestopoulos *et al.*, 2020), food security (Haroun, Gil-Rodríguez, Neto, Machín-Sánchez, & Viera-Rodríguez, 2019; Smith *et al.*, 2019), medicine (Haroun *et al.*, 2019; Raimundo *et al.*, 2018), among other contributions. It should be noted that blue innovations are not restricted to the productive sectors of the economy. According to Heslop *et al.* (2019), in recent years, new technologies for monitoring and modeling coastal and maritime environments have allowed real-time observation and forecasting of the coastal ocean at regional and local scales, enabling, for example, monitoring climate events of high impact on the coast such as hurricanes and tsunamis. The demand for this type of technology is growing and can contribute to studies of marine environments, biodiversity, and coastal ecosystems and, consequently, socio-economic feasibility studies for the sustainable exploration of natural resources by stakeholders (Bruno *et al.*, 2020; El Mahrad *et al.*, 2020; Miguez *et al.*, 2019; Nahon *et al.*, 2019).

According to Kang *et al.* (2020), the Blue Economic perspective's technological advance is gradually skewed towards energy conservation and emission reduction. However, as the demands for blue innovations emerge, new theoretical and practical lenses of the Blue Economy that accompany these trends, such as open innovation (Stead, 2018), social innovation (Albrecht and Lukkarinen, 2020); Soma *et al.*, 2018), and the Smart Ocean (Zhang, Deng, & Jiang, 2019), in response to socio-cultural and economic challenges, in the context of climate change and the exploration of natural resources (Pudzis *et al.*, 2018).

Blue energy

The search for new sources of clean and renewable energy is one of the pillars of Blue Economy, especially considering that the world's energy matrix is still based on fossil fuels and requires a radical change in the coming years. Based on this finding, researchers and public policymakers have focused their efforts on describing the potential scenarios for the exploration of marine energy, highlighting challenges and opportunities, as well as the factors that limit its implementation in the market (Lavidas *et al.*, 2020; Pinarbasi *et al.*, 2019; Pisacane *et al.*, 2018; Wright, 2016).

To García, Ruiz, and Sanabria (2020) and Gilau and Failler (2020), the factors that either prevent or make it difficult for countries to incorporate public policies, technologies, and blue energy innovations in their energy matrices lie primarily (1) in the development of clean energy technologies, with the lowest cost and affordable price; (2) incentive and regulatory policies that should be directed towards effectively managing the multiple uses of marine environments, as well as a supportive framework for the industry; (3) political uncertainty in the development and absorption of blue energy generation capacity and its technologies; and (4) the ability of organizations to face the challenges of an emerging sector.

In this sense, the development and access to cleaner innovations and technologies are essential for the sustainability of the sector, as they are unlimited sources and reduce the emission of gases that cause the greenhouse effect, that is, global warming and, therefore, slow the increase in the Earth's temperature and the consequent climate changes that have been perceived worldwide (Flynn, 2015; Frades *et al.*, 2020; García *et al.*, 2020; Pisacane *et al.*, 2018; Uihlein and Magagna, 2016). Among the main types of renewable marine energy mentioned in the literature are offshore wind energy (Flynn, 2015; Frades *et al.*, 2020; Pinarbasi *et al.* 2019) and wave and tidal energy, or ocean energy (Lavidas *et al.*, 2020; O'Hagan, Huertas, O'Callaghan, & Greaves, 2016; Uihlein and Magagna, 2016). However, from the perspective of the Blue Economy, some authors reverberate that deepwater mining (Carver, 2019; Gilau and Failler, 2020) and oil and gas extraction (Gilau and Failler, 2020; Murray *et al.*, 2018) also constitute forms of exploration of marine resources that can be framed in the perspective of the Blue Economy. This is because such activities, if the sustainability issue is not observed, can bring biological or geochemical impacts, for example (Koschinsky *et al.*, 2018).

Tourism

There is a consensus in the literature on the numerous environmental impacts caused by the traditional and mass tourism industry (Cisnero-Montemayor *et al.* 2020; Drius *et al.*, 2019; Jones and Navarro, 2018; Karani and Failler, 2020; Sumarmi *et al.*, 2020). Tourism linked to the oceans and the coast is a dynamic activity that encompasses several correlated segments, such as sports tourism (CHEN, 2020), diving (Sumarmi *et al.*, 2020), cruise (Leposa, 2020), community-based tourism (Pafi, Flannery, & Murtagh, 2020; Phelan, Ruhanen, Mair, 2020), among others.

Given this context, Karani and Failler (2020), Stratigea and Katsoni (2015), and Tzoraki *et al.* (2018) report the need for strategies and action plans that place resilience, preservation of beaches and coastal environments, biological diversity, and socio-cultural integrity at the epicenter of public policies for sustainability at local, regional, national and international levels, that is, that make tourism a sustainable activity in its economic, social, and environmental dimensions. Sari and Nazli (2020) reinforce this understanding by emphasizing how the 2030 Agenda of the United Nations (UN) can help develop sustainable tourism in less developed countries. To Francis and Nair (2020), the UN, through the Sustainable Development Goals (SDGs), more specifically SDGs 1, 2, and 17, has sustainably encouraged tourism. Drius *et al.* (2019) report that coastal tourism is one of the five priorities of the European Union's Blue Growth Strategy.

According to Leposa (2020) and Phelan *et al.* (2020), Blue Economy has encouraged sustainable tourism or ecotourism, especially community-based ecotourism, based on engagement and interaction with nature, place identity, therapeutic value, spiritual value, social ties, empowerment, and challenges, for both the local population and tourists. According to Cisnero-Montemayor *et al.* (2020) and Paiano, Croella, and Lagiola (2020), this new form of tourism can leverage the emergence of innovations in services and products as in business models focused on the marine environment.

Critical studies

Although the discussion on the sustainable exploration of the seas, oceans, and coastal environments is recent, some studies raise critical questions about public policymakers and researchers (MORRISSEY, 2017) and the legitimacy of the Blue Economy's actions and genuine intentions. To Silver *et al.* (2015), Voyer *et al.* (2018), Winder and Le Heron (2017), there is recognition, at a global level, that discussions on an objective definition of the term Blue Economy are not fully concluded. However, despite this recognition, the blue economy is defended for its capacity for sustainable exploration of marine resources and its potential for socio-economic development (Hadjimichael, 2018; Mulazzani and Malorgio, 2017; Voyer and Leeuwen, 2019).

However, researchers and scholars have focused on pointing out the contradictions inherent to the goals of blue growth and questioning how the social, ecological, and economic goals can be achieved under policies centered on the blue economy. These researchers draw attention to the inherent dangers that reside in such economic development strategies, considered to be new forms of accumulation capitalism (Andriamahefazafy, Bailey, Sinan, & Kull, 2020; Brent, Barbesgaard, & Pedersen, 2020; Hadjimichael, 2018; Said and MacMillan, 2020).

To Morrissey (2017), the construction of the scientific bases of the Blue Economy was done without the proper interaction of the actors involved and with the participation of few social scientists, marine biologists, chemists, and ocean physicists and, thus, excluded areas scientists and essential researchers in the debate to respond to the urgency of the discussions around the Blue Economy. In the meantime, according to Childs (2020), a counter-narrative of the Blue Economy emerged, the critique of Blue Degrowth. This means a degrowth's goal of providing a conservation framework to ensure a just transition from neoliberal forms of governance, which places the needs of social and environmental well-being above the interests of state actors, private investors, and tourists. In other words, degrowth seeks to avoid transposing a new agenda to the detriment of another so that contextual and historical issues need to be recognized and their inherent structural effects continually analyzed (Andriamahefazafy *et al.*, 2020; Carver, 2020; Howson, 2020; Rilov *et al.*, 2020) to create a radical, social, and environmental change (Kaşdoğan, 2020).

CONCLUSION

The results show that the interest and research focus on the Blue Economy has gained greater attention from researchers, as the environmental pressure, from the wider society and international agreements for the sustainability of the seas and oceans grows. This paper sought to survey the state-of-the-art of the Blue Economy/Blue Growth in order to consider nearly three decades of publications in three languages, considering Brazilian or foreign databases, initially finding 2,817 articles.

The scientific/academic production on the subject is on the rise, which denotes trends for the increase of research in this area, as it is a multi- and interdisciplinary field of development and innovation, whose economic and social importance is essential for the sustainable development of countries and for the planet, which also expresses the direction of more and more researchers attentive to the theme. The journal *Marine Policy* has the most significant number of works, 81 studies, representing 21.83% of the research, while 64.12% of the journals published only one work on the subject.

This study opens suggestions for more in-depth research on Blue Economy and related themes, which may help public managers, researchers, the private sector, and local fishermen's

organizations, as well as other public and private institutions to promote sustainable development based on oceans, seas, coasts, and other aquatic environments from the perspective of Blue Economy. Hence, through this research, we noticed that the multiple sources and analysis systems could be configured in a critical methodology for promoting and developing studies on Blue Economy. Thus, for future studies, we suggest searching other databases, searching for works in other languages, and expanding the unit of analysis involving articles from events, books, dissertations, and *strictu sensu* theses to refine the analysis and discussion.

Therefore, future research can systematically explore the advancement of these thematic axes at local, regional, and national levels, bringing to light the strategies that have been or should have been adopted for more excellent proximity to the Blue Economy and the goals of the SDG 14. A central aspect that needs to be explored is the advance not only theoretical and descriptive but also practical and prescriptive on the paths that lead to Blue Economy concerning several aspects, among which the new patterns of inter-cooperation institutions that are configured to establish the Blue Economy.

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