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Exploring Blue Economy Trends: A Study Utilizing Factorial Analysis and Thematic Analysis

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ABSTRACT

This study aims to examine the research patterns and dynamics within the blue economy domain from 2017 to 2023, utilizing factorial and thematic analysis techniques. The study analyzed 981 bibliographic records, including articles, conference papers, and reviews, from the Web of Science database, using the term "blue economy." Biblioshiny facilitated the bibliometric analysis, employing methods like correspondence analysis, multiple correspondence analysis, and multidimensional scaling to identify research themes and clusters. A qualitative thematic examination of the top 50 cited articles complemented the quantitative analysis. The results indicated expansive and collaborative research efforts, with an average citation rate of 10.63 per document, reflecting significant scholarly engagement. Interdisciplinary exploration was evident through keyword and author frequency analysis, particularly focusing on marine ecosystems, energy, fisheries management, and climate change. Thematic mapping revealed distinct clusters related to spatial planning, energy, aquaculture, and offshore wind. While the study provides valuable insights into blue economy research trends, potential limitations arise from the reliance on a single database (Web of Science) and the exclusion of non-English publications. The study contributes to understanding blue economy research trends and priorities, informing sustainable ocean resource management. The study highlights the importance of interdisciplinary collaboration in addressing challenges associated with sustainable ocean resource management. This comprehensive analysis provides novel insights into blue economy research themes, clusters, and interdisciplinary collaborations, advancing knowledge and informing future research directions.

Keywords: *Biblioshiny Software, Blue Economy, Factorial Analysis, Thematic Analysis, Web of Science Database*

8. INTRODUCTION

The Blue Economy, an emerging concept, emphasises the sustainable use of marine and coastal resources for economic growth, livelihoods, employment and the health of ocean ecosystems ([1]; [2]). It includes traditional maritime sectors such as fishing, tourism and shipping as well as new activities such as offshore renewable energy, aquaculture, seabed mining and marine biotechnology ([3]). As the blue economy evolves, it is crucial to identify new research directions, knowledge gaps, opportunities and challenges. Research spans the areas of sustainable resource management, marine conservation, technological innovation, and governance and policy frameworks ([4], [5], [6], [7]). Sustainable fisheries management aims to reduce overfishing and restore fish stocks. Technological advances such as satellite monitoring and artificial intelligence could improve maritime safety and efficiency. Discoveries in marine biotechnology could contribute to new medicines, biomaterials and biofuels from marine organisms ([8]; [9]). However, habitat destruction, pollution, the effects of climate change and the complexity of regulations pose a major challenge. Harnessing insights from science, industry, government and civil society can unlock the potential of the blue economy while preserving the health of the oceans ([10]). In 2015, the UN adopted Sustainable Development Goal 14, which emphasises the value of the oceans in sustaining life. The Blue Economy strikes a balance between economic growth, social inclusion and environmental sustainability, recognising that these areas are interconnected ([11]). Bibliometric techniques that capture research trends, key players and clusters could provide insights into the limited blue economy literature. Factorial analysis examines texts to explore hidden themes and topics for a more nuanced understanding. Thematic analyses help to understand general research themes and areas of consensus or divergence ([12]). However, few studies have utilised these combined methods for an exhaustive assessment

of the breadth and depth of blue economy research, often focusing only on specific areas ([13]). This study aims to fill this gap by conducting a macro-level bibliometric analysis of academic publications on the blue economy indexed in the Web of Science from 2017 to 2023 and uses factorial correspondence analysis to identify research topics and clusters. In addition, a detailed qualitative thematic analysis is conducted to identify core topics covered in global blue economy research and to determine the relationships between the topics. The findings are intended to benefit researchers, policy makers, industries and stakeholders by providing actionable insights into active research areas, opportunities for collaboration, research gaps and opportunities for further scientific enquiry.

2. LITERATURE REVIEW

The blue economy has emerged as a strategic approach to the sustainable use of marine resources to promote economic growth, improve livelihoods and support the conservation of ocean biodiversity ([14]). It emphasises holistic, integrated management of the oceans, seas and coasts, focusing on low-impact activities such as renewable energy, green shipping, ecotourism and sustainable fisheries ([15]). The definitions vary, but have the common denominator of achieving a balance between economic development and the protection of the marine environment ([15]; [16]). This is in line with UN Sustainable Development Goal 14, which provides for the protection and sustainable use of marine resources. Sustainable marine industries such as fisheries, maritime transport, coastal tourism, marine aquaculture, marine renewable energy and blue biotechnologies have significant economic growth potential ([17]). However, to realise this potential while combating marine pollution and exploitation, an integrated, ecosystem-based model of ocean governance is needed. Bibliometric analysis was used to map the blue economy research landscape and identify trends. Studies have analysed keywords, networks and relationships between the blue economy and aspects such as sustainability, governance, economics, ecosystem protection and industrial development ([18]; [19]). Others have focussed on specific sectors such as coastal tourism, fisheries exploitation and blue carbon sinks ([20]; [21]; [22]; [23]). Topics analysed include sustainable development, impact assessments, management approaches and climate change impacts. [24] identified four research themes: basic theory and development direction, ecological and environmental sustainability, marine development methods, and comprehensive benefits and functions. [13] identified three stages of development (enlightenment, foundation and rapid growth), mature and potential leading-edge clusters and future research directions. [25] found that ocean literacy is increasingly recognised but faces limitations in diffusion in sectors such as the blue economy and in certain regions. [26] explained the circular economy as a subset of micro-level sustainability in the maritime industry, focussing on waste management and life cycle assessment. Most studies, while valuable, use only basic bibliometric methods and make limited use of advanced techniques such as factorial clustering of study themes and qualitative thematic analysis to abstract research patterns. In addition, a multidimensional macro-level assessment focusing on core intellectual themes within a broader discourse on the blue economy and the mapping of knowledge networks between countries is lacking. This study aims to fill this literature gap by employing a composite methodology for a macro-level bibliometric analysis, a factorial correspondence analysis to identify research topics and clusters, and a detailed qualitative thematic analysis to identify core themes of the global blue economy and relationships between themes. The results will provide actionable insights for researchers, policy makers, industries and stakeholders.

3. RESEARCH METHODOLOGY

This study uses the Web of Science database to retrieve bibliographic records on blue economy research from 2017 to early 2023. Web of Science was selected for its comprehensive coverage of peer-reviewed academic literature from the natural and social sciences ([27]). However, its limitations include its focus on English-language publications and the underrepresentation of certain regions or disciplines ([28]; [29]). 981 documents were retrieved with the search query "blue economy" and analysed using the Biblioshiny software package. Factorial analysis techniques were used, including correspondence analysis (CA), multiple correspondence analysis (MCA) and multidimensional scaling (MDS). These techniques uncover hidden structures, patterns and relationships in complex datasets ([21]) and are well suited to the multi-layered field of the blue economy, which includes economic activities, environmental concerns, governance frameworks and social impacts. CA and MCA process categorical data effectively, while MDS analyses similarities between regions or countries based on blue economy performance. Complementing factorial analysis, thematic analysis provides a qualitative approach to identifying patterns or themes within the data ([30]). By combining the thematic analysis with the quantitative findings from CA, MCA and MDS, researchers gain a comprehensive understanding of trends in the blue economy, encompassing both numerical patterns and contextual narratives. Factorial analysis methods were applied to the occurrence of keywords, author keywords and index keywords to identify underlying research themes and clusters. In addition, a systematic qualitative thematic analysis of the summaries of the 50 most cited articles and author keywords was conducted to uncover the predominant major research themes and reveal the relationships between the major conceptual categories in the global blue economy.

3.1 PRISMA Framework

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework is a widely accepted guide for conducting and reporting systematic reviews, meta-analyses and bibliometric analyses. The PRISMA flowchart, shown in Figure 1, provides a visual representation of the different stages involved in the process of bibliometric analysis. The flowchart begins with the identification phase, in which an initial search for relevant studies is conducted in multiple databases and other sources. The identified datasets are then screened using predefined inclusion and exclusion criteria, eliminating irrelevant or duplicate studies. In the next phase, the remaining studies are thoroughly screened for eligibility by assessing the full-text articles. Studies that do not fulfil the eligibility criteria are excluded and the reasons for exclusion are documented. The included studies then enter the final phase, in which the data are extracted and summarised for analysis.

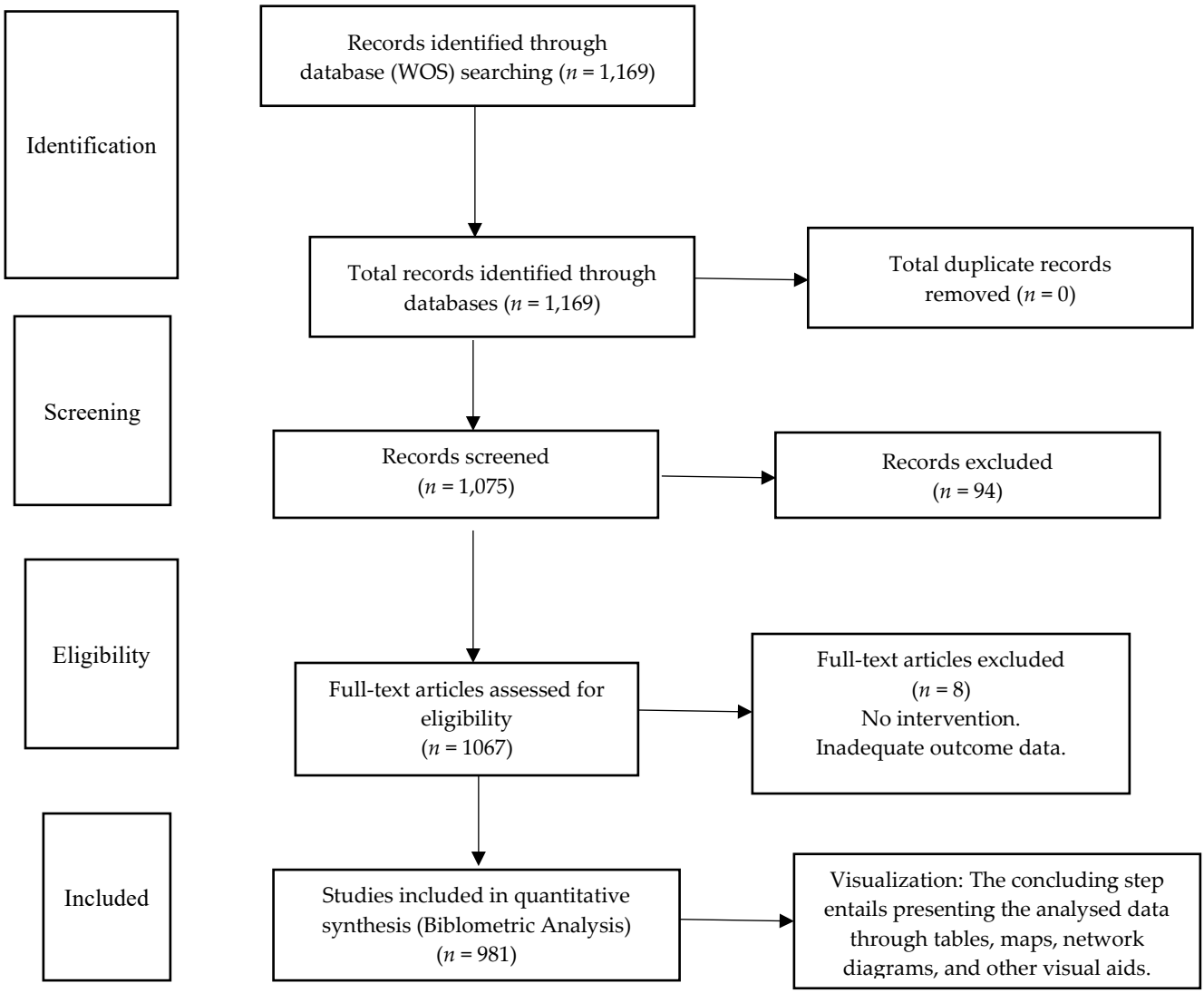

Figure 1. The PRISMA flow chart.
Source: Author

4. RESULTS

4.1 Characteristics Of Blue Economy

The characteristics of the Blue Economy as described in the table indicate a rapidly growing and developing field of research from 2017 to 2023. The use of 391 sources leading to 963 documents results in an average citation rate of 10.63 per document, indicating a healthy level of scholarly engagement – and thus the academic community's interest in and recognition of the crucial role and importance of the Blue Economy. The diversity of document types (articles, book chapters, proceedings, reviews) also demonstrates that research on the Blue Economy is highly interdisciplinary, allowing for in-depth examination and analysis of the many facets associated with the sustainable use of marine resources. Furthermore, the high number of keywords and author appearances reflects the breadth and depth of topics covered within the blue economy discourse. The collaborative nature of the research, with an average of 5.13 authors per paper and a collaboration index of 5.91, emphasises the collective effort required to address the complex challenges and opportunities associated with ocean-based economic activities.

Table 1. Research Topics

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2017:2023
Sources (Journals, Books, etc)	391
Documents	963
Average years from publication	2.8
Average citations per documents	10.63
Average citations per year per doc	2.233
References	1
DOCUMENT TYPES	
Article	692
Article; book chapter	57
Article; data paper	4
Article; early access	20
Article; proceedings paper	5
Article; retracted publication	1
Proceedings paper	73
Review	106
Review; book chapter	2
Review; early access	3
DOCUMENT CONTENTS	
Keywords Plus (ID)	2216
Author's Keywords (DE)	2946
AUTHORS	
Authors	4938
Author Appearances	6279
Authors of single-authored documents	125
Authors of multi-authored documents	4813
AUTHORS COLLABORATION	
Single-authored documents	149
Documents per Author	0.195
Authors per Document	5.13
Co-Authors per Documents	6.52
Collaboration Index	5.91

Source: Biblioshiny (2017)

4.2 Annual Scientific Production

Figure 2 illustrates the annual scientific production in the field of blue economy research in the period 2017-2023. The data show a clear upward trend in the number of articles published annually. The observation period begins in 2017 with 20 articles, and the number increases steadily over the years. From 2019, a significant acceleration in production can be observed: The number of articles published annually rises sharply and peaks at 253 articles in 2023. This trend indicates a research landscape that is expanding and maturing, likely driven by the increasing recognition of the importance of sustainable ocean-based economic activities. The growing body of literature is an indication of increased scientific engagement and the emergence of new research opportunities in the field of the blue economy.

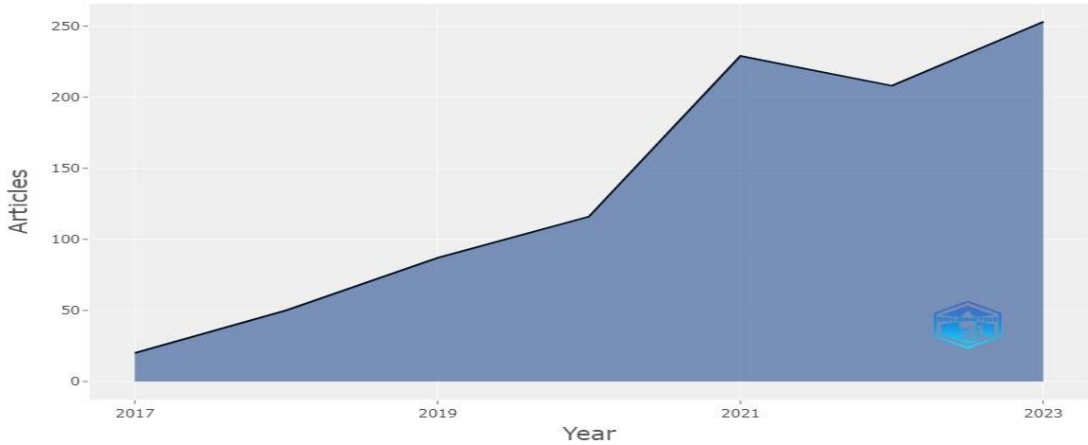

Figure 2. Annual Scientific Production
Source: Biblioshiny (2017)

Figure 3 illustrates the scientific production of countries in the context of the blue economy in different countries and regions. The United States tops the list with a remarkable frequency of 728 articles, indicating its significant contribution to blue economy research. It is closely followed by Australia and the United Kingdom with 369 and 342 articles respectively, demonstrating their active engagement in this area. Several factors probably influence the distribution of scientific production across countries. Geographical location and proximity to the marine environment may play a role, as evidenced by the high output of coastal nations such as Italy, Spain and Portugal. Economic factors, research infrastructure and government policies to support marine research can also affect a country's scientific output in the blue economy. Emerging economies in particular, such as China and Brazil, are also active in blue economy research, with 191 and 76 articles respectively. This shows that they are increasingly recognising the economic potential and environmental importance of marine resources. Countries with a lower scientific output, such as African countries and some island states, may face challenges in terms of research funding, infrastructure and capacity building. However, their participation in blue economy research is crucial for addressing local challenges, promoting sustainable development and engaging in the global discourse on ocean management and conservation.

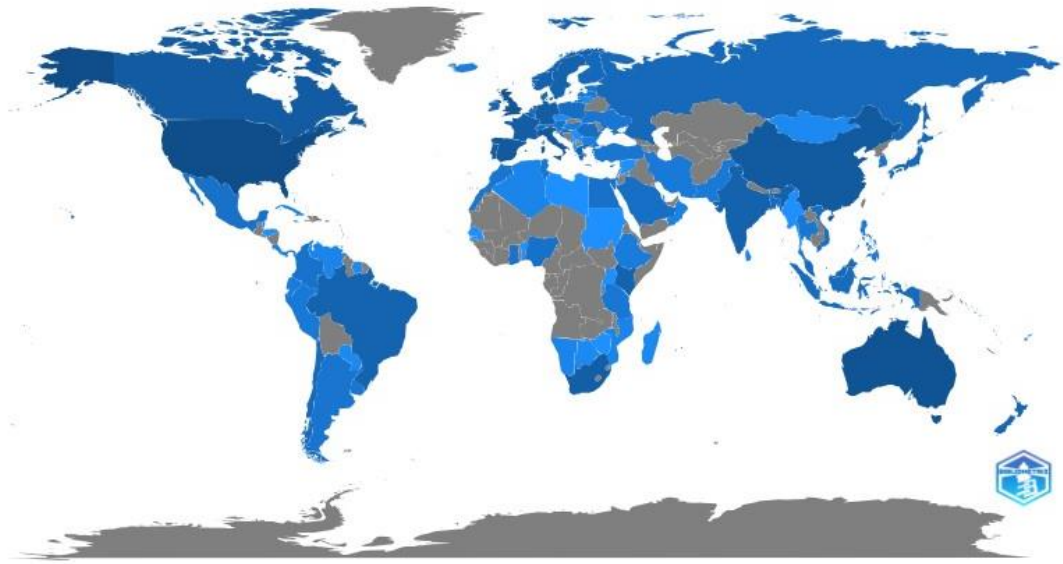

Figure 3. Countries Scientific Production
Source: Biblioshiny (2017)

4.3 TREEMAP

Figure 4 shows the treemap of the various aspects of the blue economy and the associated concepts. The largest rectangle in Figure 4 is the "blue economy"," which is mentioned 387 times and accounts for 35% of the total mentions. The blue economy encompasses the sustainable use of marine resources for economic growth, better living conditions and jobs while maintaining the health of marine ecosystems. Its dominance in the tree map shows that it is the central theme of the document. Next to the "blue economy" are the terms "aquaculture"," "sustainability" and "sustainable development" with 46 mentions each, representing 4% of the occurrences. Although they appear to the same extent as the term "blue economy'," it is clear that both "aquaculture" and "sustainability" are essential components in the wider context of marine and coastal economic activities. Aquaculture refers to the breeding, rearing and harvesting of fish, shellfish, algae and other organisms in all types of waters. This means that the inclusion of aquaculture in the diagram shows that the focus is on finding sustainable marine farming methods that pave the way for an industrial blue economy without jeopardising the environment. Meanwhile, sustainability and sustainable development can be seen to overlap with the blue economy at numerous points, as both revolve around the concept of promoting economic practises that meet the needs of people while balancing the needs of future generations. The document discusses the blue economy from a sustainability perspective. The term "blue growth" mentioned in 56. and 5. seems to be a strategy to support sustainable growth in the maritime sector as a whole. It is a more specific aspect of the blue economy that explores the potential to promote economic growth based on the sustainable use of marine resources. Other terms such as "marine spatial planning"," "ocean governance"," "climate change" and "fisheries" indicate a wide range of topics related to governance, challenges and activities within the blue economy. "Marine spatial planning" with 33 mentions (3%) and "ocean governance" with 31 mentions (3%) indicate the structured process of analysing and allocating parts of the marine space to achieve environmental, economic and social goals. "Climate change"," also with 3%, emphasises the impact of environmental changes on the marine economy. "Fisheries", with 29 mentions (3%), emphasises the importance of sustainable management of fish stocks. Smaller rectangles represent niche topics such as "Tourism"," "Equity"," "Sustainable Development Goals (SDGs)"," "Algae" and geographical areas such as "South Africa"," "Bay of Bengal"," "Bangladesh"," "China" and "Seychelles" These terms may refer to specific case studies, regional analyses or aspects of the blue economy such as the role of tourism, social justice issues, alignment with the SDGs and the importance of certain marine products like seaweed.

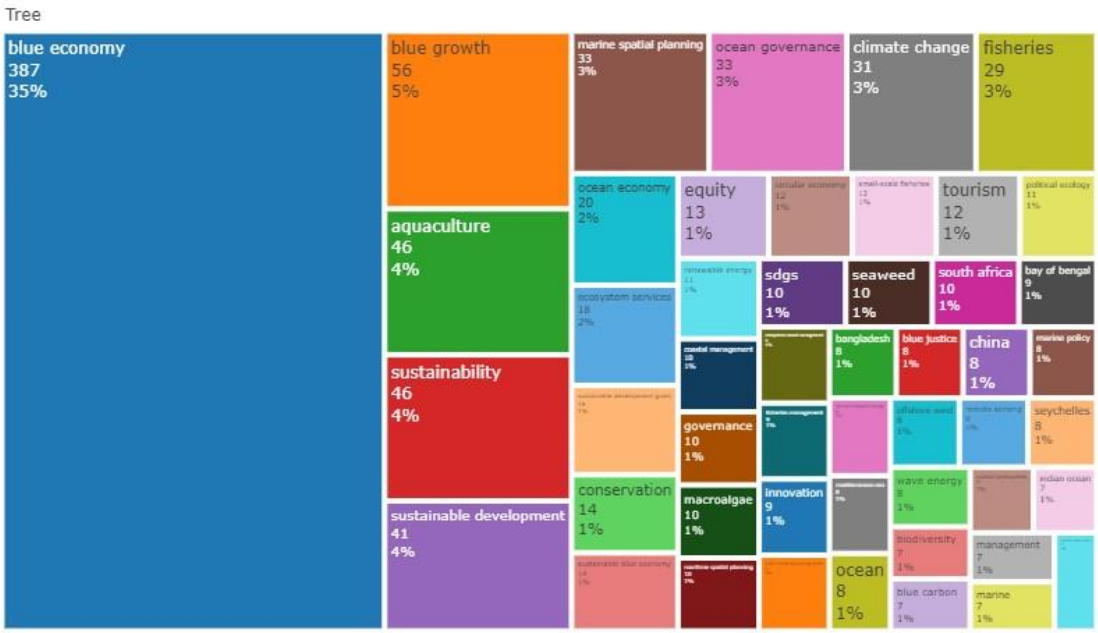

Figure 4. Treemap
Source: Biblioshiny (2017)

4.4 Most Cited Countries

Table 2 provides an insight into the most frequently cited countries in Blue Economy research and shows both the total number of citations and the average number of citations per article. Australia tops the list with 2,245 citations, reflecting the importance of its research contributions in this area. Canada follows closely behind with 1,056 citations and has the highest average number of article citations at 25,143. This indicates the high quality and influence of his publications on the blue economy. Despite having the second highest number of citations at 1,066, The US has a slightly lower average citation per article compared to Australia and Canada, but this still indicates a significant reach of its blue economy research. Interestingly, countries such as Bangladesh and South Africa have very high average article citations. Even though the total number of citations is lower in these countries, the individual research papers still have a large impact. The fact that China, India and Brazil are among the most cited countries illustrates the global reach and interest in blue economy research and shows that emerging economies will play a fundamental role in influencing sustainable ocean-based economic activity in the coming decades. Among the leaders in the ranking are the Netherlands, which has one of the highest average article citations over the five-year period with an average of 28.4. This is a key indicator of how influential and high quality the research findings are in relation to the number of citations they receive.

Table 2. Most Cited Countries

Countries	**Number of citations**	**Average article citations**
Australia	2245	23.385
USA	1066	10.057
Canada	1056	25.143
United Kingdom	996	11.067
China	575	9.914
Italy	522	9
Germany	371	14.84
Spain	338	6.76
South Africa	251	8.097
Bangladesh	210	13.125
Sweden	192	9.143
India	188	6.714
Kenya	150	7.5
Brazil	145	8.529
Netherlands	142	28.4
Norway	138	9.857
Portugal	133	4.586
Korea	132	44
Saudi Arabia	101	14.429
Ireland	92	10.222

Source: Biblioshiny (2017)

4.5 Co-Occurrence Analysis

Fig. 5 shows an analysis of the co-occurrence of key terms in blue economy research, highlighting clusters of related concepts and their importance within the discourse. Several prominent nodes are identified within the network, each representing a specific theme or theme relevant to the blue economy. The "Blue Economy" node proves to be the most central, with high scores for interconnectedness, proximity and PageRank, emphasising its importance and centrality within the network. It essentially acts as a central node that connects to a variety of other concepts and themes within the blue economy discourse. As it turns out, the other nodes that are closely linked to “blue economy” include concepts such as “aquaculture",” “sustainability",” “fisheries",” “marine spatial planning” and “climate change",” demonstrating the multifaceted nature of blue economy research. These interlinked concepts emphasise the complex and interdisciplinary nature of sustainable ocean-based economic activities. In addition, the analysis identified several distinct clusters, including 'blue growth' and 'sustainable development', which represent specific sub-themes within the broader blue economy context and encompass concepts such as 'sustainable development goals',” 'marine governance' and 'coastal management',” suggesting a focus on holistic approaches to economic growth without jeopardising environmental health and ensuring that the new economy benefits all groups in society. Nodes relating to governance and policy, such as 'ocean governance' and 'equity',” suggest that effective governance frameworks and the equitable distribution of benefits are key to the success of the blue economy, which is synonymous with sustainable development.

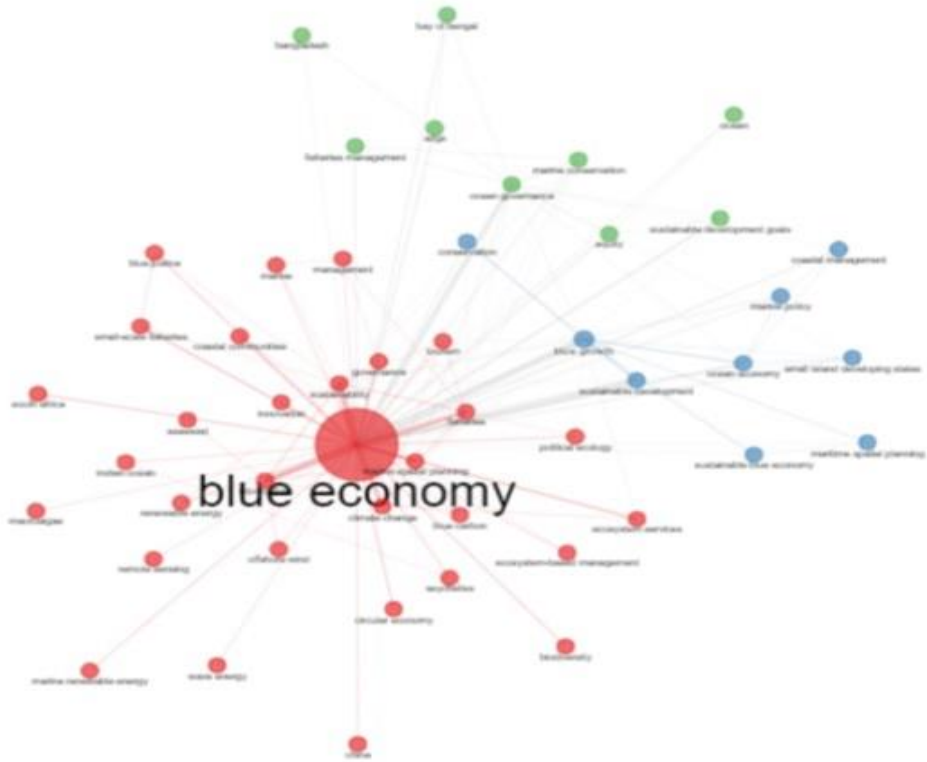

Figure 5. Co-Occurrence Analysis
Source: Biblioshiny (2017)

4.6 Authors' Collaboration Networks

In examining author collaboration networks within blue economy research, Figure 6 shows the patterns within which authors collaborate and the centrality of certain key authors within these networks. Each node in Figure 6 corresponds to an author, and the data includes betweenness, closure and PageRank, which help to capture the relative importance and influence of authors in their respective clusters. Notable authors are Danovaro R, Bianchelli S and Verdura J, who are in cluster 1. This suggests that these authors collaborate within their research community, as they have low betweenness and low closeness but moderate PageRank, indicating that they have moderate influence within their cluster. Authors in Cluster 2, e.g. Cisneros-Montemayor AM, Singh GG, who have higher Betweenness and PageRank scores, may be more important for connecting and disseminating information within their collaborative network. Their central role in their respective clusters suggests that they may be involved in coordinating knowledge exchange and research on the integration of ecological, social and economic research in aquatic systems. Authors in clusters 3, 4, and 5 have negligible Betweenness, Closeness, and PageRank scores, suggesting that they are less central or influential to the collaborative network in which they are located; however, it is important to remember that they may still contribute valuable insights and expertise to their collaborative research efforts. Clusters 6 to 12 consist of authors with different Betweenness, Closure and PageRank scores, suggesting different patterns of collaboration and influence within blue economy research. Authors with higher scores may act as central figures or key connectors within their collaborative networks, facilitating knowledge exchange and promoting joint research initiatives.

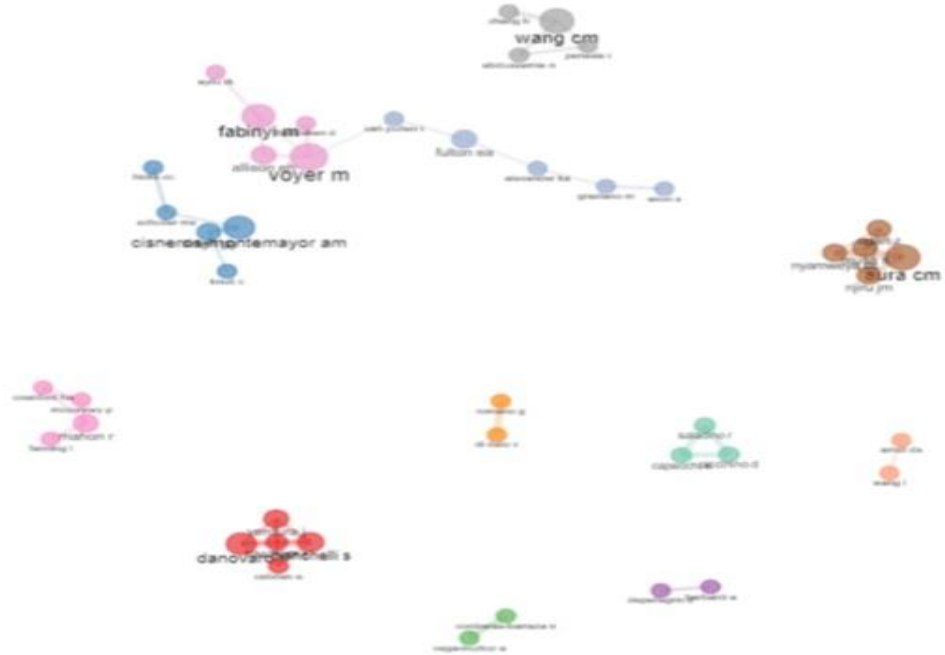

Figure 6. Authors' Collaboration Networks
Source: Biblioshiny (2017)

4.7 Trend Topic

Table 3 shows the trending topics related to blue economy research. This table shows the number of articles in which these trending topics are mentioned and gives an insight into the development and frequency of these themes over time. These trends are indicative of the changing and emerging focus and areas of interest in this field. The blue economy is the most important topic with 387 mentions across all publications. This trend topic peaked in 2020 and is also predominant in 2021 and 2022. This shows that scientific activity to explore the economic potential of marine resources and promote sustainable economic activities at sea will continue. Aquaculture and sustainability are also important topics that show an increasing frequency over the years, indicating that more and more attention is being paid to the development of sustainable aquaculture and the broader studies on sustainability in the blue economy literature. Similarly, the frequency of 'blue growth' increases markedly from 2019to 2022, indicating an increasing exploration of potential ways to promote economic growth in the marine sector in a way that is compatible with the identity of environmental sustainability. Similarly, the themes of 'marine renewable energy', 'marine spatial planning' and 'ocean governance', which are particularly prevalent in 2019-2022, all relate to energy needs, a planning framework and a set of governance beliefs that are prerequisites for successful sustainable ocean development in the 21st century. In 2019-2022, 'fisheries management' and 'fisheries' are recurrent themes – a reminder of the ongoing efforts to 'green' management and solve the 'wicked problem' that has so far prevented further progress towards sustainable fisheries. Topics such as "climate change'," "sustainable development' and "ecosystem services' are gaining prominence in recent years of analysis, highlighting the increasing recognition of climate change impacts, sustainable development goals and ecosystem-based approaches in blue economy research. In addition, emerging topics such as "circular economy'," "offshore wind energy" and "social-ecological systems" show a growing interest in innovative solutions and interdisciplinary approaches to address the complex challenges of marine sustainability.

Table 3. Trend Topic

Item	Freq	Year_q1	Year_med	Year_q3
Marine Conservation	7	2018	2019	2020
Education	5	2018	2019	2021
Blue Growth	56	2019	2020	2022
Political Ecology	11	2019	2020	2022
Fisheries Management	9	2020	2020	2021
Marine Renewable Energy	8	2020	2020	2022
Blue Economy	387	2020	2021	2022
Aquaculture	46	2020	2021	2023
Marine Spatial Planning	33	2019	2021	2022
Ocean Governance	33	2020	2021	2022
Fisheries	29	2019	2021	2022
Sustainability	46	2021	2022	2023
Sustainable Development	41	2020	2022	2023
Climate Change	31	2020	2022	2023
Ecosystem Services	18	2020	2022	2023
Conservation	14	2020	2022	2023
Circular Economy	12	2021	2023	2023
Coastal Communities	7	2022	2023	2023
Ocean Sustainability	7	2022	2023	2023
Offshore Wind Energy	6	2022	2023	2023
Social-Ecological Systems	6	2020	2023	2023

Source: Biblioshiny (2017)

4.8 Factorial Analysis

In this study, we used three bibliometric factorial analysis techniques: correspondence analysis, multiple correspondence analysis and multidimensional scaling analysis. These methods aimed to assess the proximity between keywords and the overarching theme. The expectation was that this approach would reveal a significant relationship. The conceptual structure maps (Figures 7–9) provide a nuanced perspective on proximity and disparity within the research area. The results of the correspondence analysis revealed a large cluster and a smaller cluster of themes (Figure 7). The red cluster includes keywords such as 'space, planning, data, south, sea, maritime, region, ocean, coast, energy, analysis, wind, offshore, aquaculture, economy and green',” while the blue cluster is centred around the keyword 'fish' The correlation between keywords within the theme "blue economy' is relatively weak. Nevertheless, it is noticeable that keywords such as “space, planning, data, south, sea, maritime, region, ocean, coast, energy, analysis, wind, offshore and aquaculture” show close connections. Conversely, the keyword “economy and green” appears to be clearly distant from the other keywords in the same cluster, indicating a weaker relationship with the other keywords.

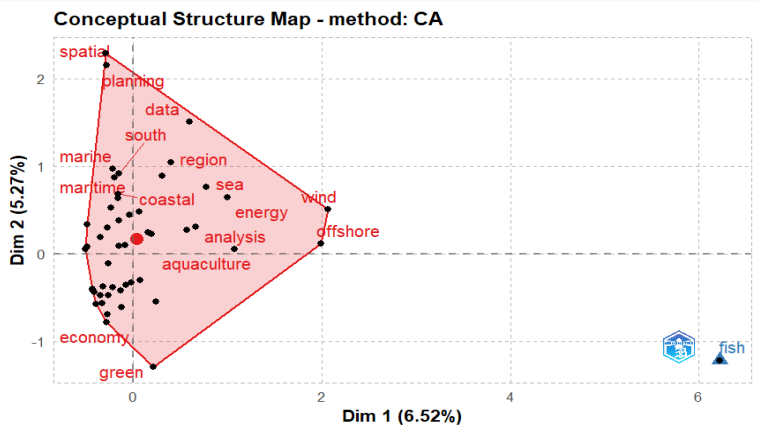

Figure 7. Correspondence Analysis (CA)
Source: Biblioshiny (2017)

The results of the multiple correspondence analysis are shown in Figure 8, where the positions of the points and their distribution across the dimensions provide an insight into the results. The analysis revealed two distinct clusters — a predominant red cluster that includes keywords such as wind, offshore, energy, fish, aquaculture, region, south, sea, role, conservation and maritime, and a smaller blue cluster that includes keywords such as spatial and planning. Both clusters have the same distance to the centre of the coordinates. When looking visually at the keyword hierarchy, it is clear that the red cluster is the largest and is relatively close to the blue cluster. However, there is no inherent relationship or similarity between the blue and red clusters.

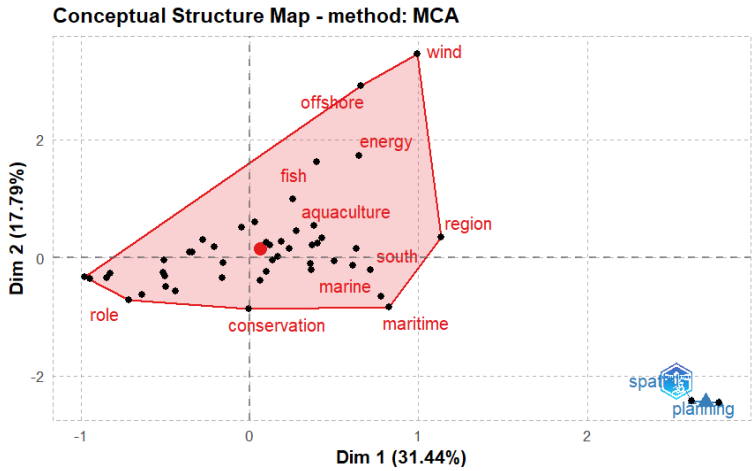

Figure 8. Multiple Correspondence Analysis (MCA)
Source: Biblioshiny (2017)

Multidimensional scaling analysis was used to analyse the themes, resulting in the identification of two clusters: the red cluster and the blue cluster (Figure 9). Within the blue cluster, keywords such as "offshore" and "wind" are prominent, while the red cluster includes keywords such as "space'," "planning'," "south'," "region'," "aquaculture'," "energy'," "fish'," "assessment'," "role'," "Caribbean'," "climate change'," "island" and "development' When visualising the cluster hierarchy, it is clear that the red cluster is the largest, with a significant gap to the blue cluster. In the red cluster, the predominant keywords are "energy" and "development"," which are further away from the centre of the coordinates, suggesting that their relationship is not particularly close.

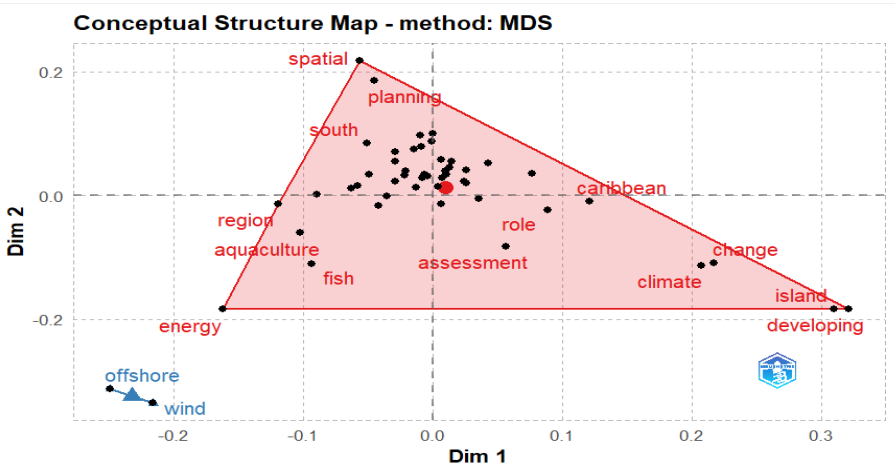

Figure 9. Multidimensional Scaling Analysis (MDS)
Source: Biblioshiny (2017)

4.9 Thematic Analysis

The qualitative thematic analysis of the 50 most cited articles included a manual review of the authors' summaries and keywords to identify the predominant themes. Two independent coders systematically analysed the textual data to uncover recurring patterns and conceptual categories within the discourse on the blue economy. This qualitative approach provided complementary insights to the factorial examination and enabled a deeper understanding of the key research themes and their significance in the field. Figure 10 shows a thematic map depicting the centrality and density metrics for different clusters within blue economy research. Each cluster represents a specific thematic focus in this area. The highest centrality and density scores are shown for the “Ocean" cluster, which indicates that ocean-related topics are the most influential and most closely connected within blue economy research. The “Management" and “Energy" clusters also have a relatively high centrality and density, which indicates their importance and interconnectedness within the blue economy discourse. Compared to the “Sea" and "Energy" clusters, the “Climate" cluster has a lower centrality but a high density, which indicates a coherent thematic focus within the climate-related topics. The “Fisheries" cluster has a moderate centrality but a high density, which indicates a strong thematic concentration and interdependence within the fisheries-related research topics. The "Oceans" cluster has a moderate centrality and density, which indicates its importance within the Blue Economy research network, albeit with a somewhat lower degree of networking compared to the other clusters.

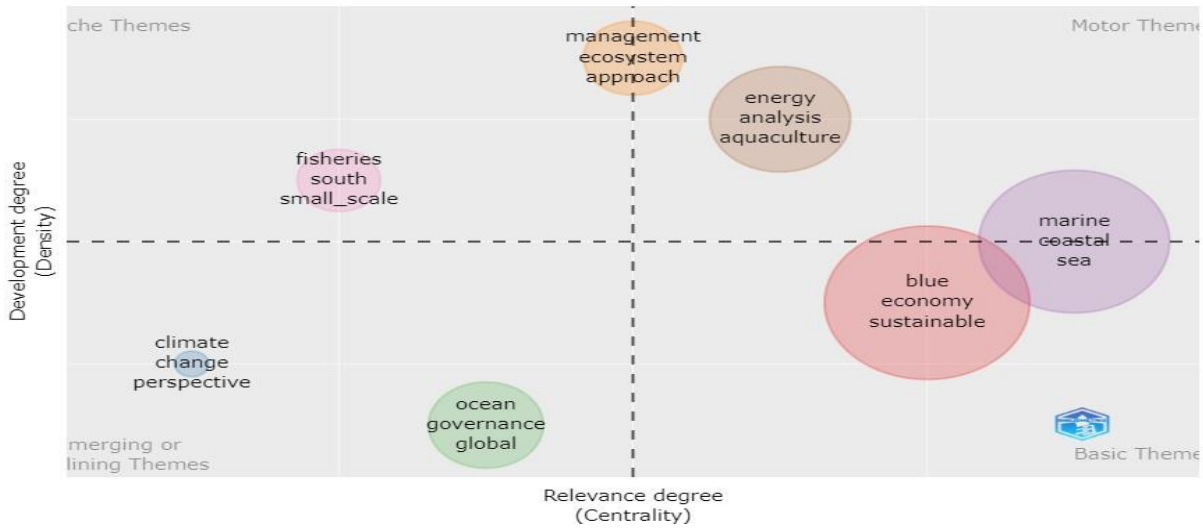

Figure 10. Thematic Map
Source: Biblioshiny (2017)

To further illuminate the patterns of keyword clusters in blue economy research, we have illustrated the thematic network of keywords in Figure 11. The keywords are categorised into different clusters based on their overlap with other keywords. The “blue” cluster consists of keywords such as “economy”, “sustainable”, “development” and “growth”. These reflect the central concern of blue economy research to find a path of sustainable economic development that is rooted in and connected to the ocean's resources. This cluster also includes keywords such as “challenges”, “opportunities” and “innovation”, which points to the multi-layered nature of the blue economy discourse. In contrast, the 'climate' cluster includes words such as 'change', 'perspective' and 'lessons” learnt', which indicate that it explores how the impacts of climate change on marine ecosystems and coastal regions are adapted and mitigated in the context of the Blue Economy. The "Ocean" cluster, for example, includes topics related to ocean governance and policy, global cooperation or an integrated approach to the sustainable development of ocean resources. The use of terms such as "governance", "policy", "global" and "community" indicates that this is a collaborative effort that encompasses holistic ocean management. The "marine" cluster addresses a range of research topics related to marine ecosystems and coastal management, marine and non-marine economic activities, environmental protection and the resolution of territorial disputes. Here, terms such as "coast", "sea", "environment" or "planning" signalise that these research strands focus on the close links between marine systems and human activities. The "Management" cluster includes terms such as "ecosystem", "approach", "model" or "framework", which we interpret as attempts to design and implement an effective management strategy, or as efforts to design an assessment framework or a set of monitoring systems that can be used to ensure sustainable and equitable use of natural resources, including their conservation. The Energy cluster focuses on topics related to energy production, including aquaculture, offshore energy, renewable energy sources and energy potential in the marine environment. This cluster reflects the growing interest in the exploration and utilisation of marine resources for sustainable energy production. Finally, the "Fisheries" cluster deals with issues of fisheries management, small-scale fisheries, food security and sustainability of resources. Terms such as "fisheries"," "food"," "knowledge" and "resource" emphasise the importance of sustainable fisheries management practises in the context of the blue economy.

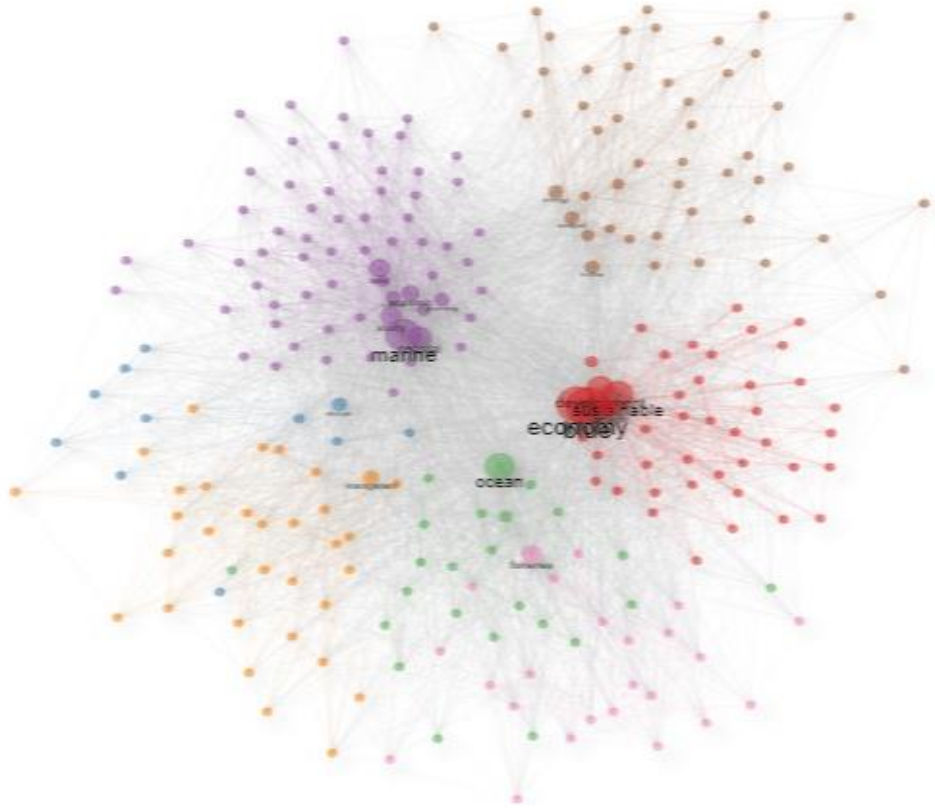

Figure 11. Thematic Network
Source: Biblioshiny (2017)

5. DISCUSSION

This study uses the Web of Science database to retrieve relevant bibliographic records on blue economy research from 2017 to early 2023. Web of Science was selected because it provides comprehensive coverage of peer-reviewed academic literature that includes scientific and social science publications. An advanced search query using “blue economy” limited the results to English-language articles, conference papers and reviews and returned 981 documents for analysis using the Biblioshiny software package. The correspondence analysis carried out in our study provides valuable insights into the thematic structure of blue economy research. Figure 7 illustrates two clear thematic clusters that emerged from the analysis: a large red cluster and a smaller blue cluster. The red cluster includes a variety of keywords, including "space, planning, data, south, sea, maritime, region, ocean, coast, energy, analysis, wind, offshore, aquaculture, economy and green" In contrast, the blue cluster focuses on the keyword "fish"," indicating a thematic concentration on fisheries-related research. Within the blue economy theme, the correlation between the keywords is relatively weak. However, certain keywords within the red cluster are closely linked, indicating thematic coherence or networking. This clustering shows clear keyword associations between the research articles on the blue economy. For example, the Blue Economy research articles most frequently revolve around the topics of space, planning, data, south, sea, maritime, maritime region, coast, energy analysis wind offshore aquaculture. These interlinked topics therefore form the core of most Blue Economy article abstracts and characterise a deeply multidimensional field of research. Conversely, the keyword association between economy, green and the other keywords in the cluster is strikingly weak, suggesting that this high-level theme may be less prominent and less clearly distributed across the broader blue economy discourse. Economy, green is strikingly distant from the rest of the keywords, suggesting that the relationship with the other words in the cluster “is 'less clear' This distance emphasises that additional work would be beneficial to illuminate the relationships and themes of blue economy research.

The MCA in our study paints an interesting picture of the thematic structure of blue Economy research (see Figure 8). Several interesting trends can be identified. There are two distinct clusters of keywords that represent different dimensions of the field. The main cluster in red includes wind, offshore, energy, fish, aquaculture, region, south, sea, role, conservation, maritime, among others. Taken together, these keywords indicate a thematic focus on different forms of marine resource utilisation, conservation and economic development. The fact that these keywords fall into the same cluster suggests that there is a degree of thematic coherence or connectedness between these research topics and that research in this cluster often addresses related topics and ideas. The smaller cluster in blue includes keywords such as spatial, planning. This cluster appears to represent a distinct thematic dimension within blue Economy research, focussing on spatial planning and management strategies related to ocean-based activities. Although the blue cluster is smaller compared to the red cluster, it represents an important aspect of blue Economy research and emphasises the

importance of spatial considerations in the sustainable management of ocean resources. What is remarkable about the MCA results is that the two clusters are kept at roughly the same distance from the centre of the coordinates. This could mean that the two smaller clusters represent different thematic dimensions that are not inherently related or similar, but reflect different facets of blue Economy research, reflecting the expected multidimensionality of the field. A visual inspection of the keyword hierarchy reveals that the largest cluster of keywords in red is relatively close to the second largest cluster in blue. This proximity could indicate a certain thematic overlap or a common focus of the two clusters. However, it is important to note that the proximity does not necessarily mean that the topics represented by the red and blue clusters are directly related or similar. Rather, it represents the nuanced, multifaceted nature of blue Economy research, where multiple thematic dimensions can overlap or influence each other to varying degrees.

This MDS analysis provides some important insights into the thematic structure of blue Economy research. As can be seen in Figure 9, there are two clear clusters of keywords that correspond to different thematic dimensions in this area. The red cluster of keywords includes space, planning, south, region, aquaculture, energy, fish, valuation, role, Caribbean, climate change, island and development. This collection of keywords appears to focus thematically on different aspects of spatial planning and regional development, aquaculture and energy, and the impact of climate change in the blue Economy. The fact that they are all found within the same cluster suggests that they are thematically very coherent (i.e. interlinked), so it would appear that this research cluster explores related themes and concepts. In contrast, the blue cluster includes keywords such as “offshore” and “wind",” which represent a separate thematic dimension within blue Economy research and focus on offshore energy production and wind energy technologies. Although the blue cluster is smaller compared to the red cluster, it represents an important aspect of blue Economy research and emphasises the importance of renewable energy sources and offshore resources for sustainable economic development. When visualising the cluster hierarchy, it becomes clear that the red cluster is the largest and has a considerable distance to the blue cluster. This spatial separation indicates that the topics represented by the red and blue clusters are relatively different and do not overlap significantly or have a common focus. Instead, they capture different aspects or facets of blue Economy research. They reflect the multidimensional nature of research in this area. Within this red cluster, we see the most common keywords, or those that are used most frequently. These keywords are "energy" and "development" They are further away from the centre of the coordinates of this cluster, suggesting that their relationships with other keywords within the cluster are not particularly close. It is therefore possible that these are not particularly distinct or unique words, but rather general thematic focuses or areas within blue Economy research that have weaker relationships with other topics in the cluster.

Also a thematic map showing the centrality and density metrics of the different clusters in Blue Economy research. A cluster in the map reflects a unique thematic focus in that area and shows how different research topics are connected to and prominent in the research network. It can be seen that this “marine” cluster has the highest callon centrality and density scores in blue Economy research. The relatively high centrality and density scores for the “marine” cluster tend to indicate that marine-related research data are central topics and that the topics in the research network are closely interlinked. The topics of this cluster include marine conservation, marine biodiversity, management of marine ecosystems and sustainable use of marine resources. Two other clusters named “Management" and “Energy" also have relatively high centrality and density scores, which also indicates that the topics are important within the blue Economy discourse and are related to each other. The 'Management' cluster is likely to include topics such as resource management, governance frameworks, policy development and sustainable practises within the blue Economy. The Energy cluster is likely to cover renewable energy sources, energy efficiency and the ongoing transition to sustainable energy solutions in maritime sectors. The "Climate" cluster, although less centralised than the "Ocean" and "Energy" clusters, has a high density, indicating a strong, cohesive thematic focus within climate-related topics. This could include, for example, research into the effects of climate change on ocean ecosystems, adaptation strategies for coastal communities, mitigation strategies for the maritime industry or political responses to climate-related challenges in the blue Economy. Fisheries cluster. The "Fisheries" cluster also has a lower centrality but a high density and indicates a strong, coherent thematic concentration and interconnectedness within fisheries-related research topics. This cluster is likely to include research on a wide range of topics relating to ocean governance, policy frameworks, integrated ocean management, oceanographic research, and the relationship of the blue Economy to broader socio-economic and environmental contexts.

Furthermore, it was analyze the themes of keywords that emerge in blue Economy research. I identify different clusters of keywords based on the terms that appear and the frequency with which they are linked. Each cluster I identify represents a particular thematic focus within the blue Economy discourse. The cluster "blue" is the core of blue Economy research. Key terms include 'economy', 'sustainable', 'development', 'growth' and the variants mentioned above. From a blue Economy perspective, it is revealing that the terms associated with energy research are seen as the core of the discourse. They imply a push for sustainable economic development linked to the ocean's resources. Words such as "challenges", "opportunities" and "innovation" indicate that blue economy themes cover a broad spectrum. the word "Climate' appears in the terms "change'," "perspective" and "lessons learnt", suggesting a thematic focus on understanding and addressing the impacts of climate change on marine ecosystems and coastal regions within the blue Economy. This trend also shows the growing recognition of the links between climate change and sustainable economic activities at sea. The "Ocean" cluster highlights the discussion on ocean governance, policy and global co-operation in the sustainable use and management of ocean resources. Key words such as "governance"," "policy"," "global" and "community" emphasise the collaborative and holistic nature of efforts aimed at the sustainable management and conservation of ocean ecosystems for sustainable economic activities. The "marine" cluster therefore includes research topics dealing with marine ecosystems, coastal management and human activities, economic activities in the biosphere and environmental protection. the terms "coast"," "sea"," "environment" and "planning" also point to the interconnectedness of human activities with marine ecosystems

(and the need to include environmental aspects in Blue Economy strategies). In the "Management" cluster, the terms "ecosystem"," "approach"," "model" and "framework" illustrate the team's aim to develop efficient management techniques, assessment frameworks and means of monitoring sustainable use and conservation in the context of the Blue Economy. This cluster emphasises the importance of an ecosystem-based approach to ocean management, ensuring that the pursuit of economic development and environmental protection can be achieved simultaneously. In this cluster, there are a number of topics related to "energy"," such as aquaculture, offshore, renewable energy and potential. This increase in enquiries is linked to the growing interest of industry in exploring and utilising marine resources, with a focus on sustainability, and the promise of policy makers to reduce dependence on fossil fuels and make the transition to renewable energy sources. 'Fisheries' topics include fish stock management and small-scale fisheries, as well as 'food' and 'knowledge'." It highlights the importance of integrating fisheries into the framework of a Blue Economy to ensure food security and preserve marine biodiversity.

5.1 Managerial Implications

The results of the study provide a comprehensive roadmap for managers and decision makers involved in the development and implementation of blue economy strategies. Through the use of advanced analytical techniques, the study has identified various clusters and trends in the blue economy research landscape and illuminated the intricate relationships and connections between the various facets of this multidimensional field. One of the key implications for managers is the ability to prioritise effectively when allocating resources. The results of the study highlight areas with high centrality and density scores, such as marine, management and energy clusters, indicating their importance and interconnectedness within the blue economy discourse. With this knowledge, managers can strategically allocate their resources to these high-impact areas, ensuring that investment is channelled into the most influential and connected sectors. In addition, the identification of specific clusters and trends can guide strategic planning and support the development of targeted initiatives. Managers can use these insights to develop customised strategies and programmes tailored to the specific needs and opportunities within each cluster. For example, initiatives that focus on marine resource management, energy sustainability or governance frameworks can be designed to address the particular challenges and priorities of each cluster. In addition, the results of the study can inform investment decisions by highlighting emerging trends and potential areas for future growth within the blue economy. By adapting to these trends, managers can position themselves as early movers, capitalise on emerging opportunities and gain a competitive advantage in the rapidly evolving blue economy landscape. Ultimately, the study provides managers and decision makers with a comprehensive understanding of the blue economy research landscape so they can make informed decisions that promote sustainable economic growth while protecting the integrity of marine ecosystems and resources. By utilising this knowledge, managers can develop holistic strategies that balance economic prosperity with environmental responsibility, paving the way for a sustainable and thriving blue economy. The study contributes to the literature on the blue economy by employing advanced factorial analysis techniques such as correspondence analysis, multiple correspondence analysis and multidimensional scaling to philtre out research trends and clusters. These analyses provide a comprehensive understanding of the relationships between keywords, themes and clusters in the blue economy. The theoretical frameworks and conceptual models derived from these analyses enhance our understanding of the complex dynamics that have driven the emergence of blue economy scholarship and provide a roadmap for future theoretical development in the field.

5.3 Practical Implications

The study emphasises the importance of ocean-based economic activities as a sustainable solution to global challenges such as sustainable development, economic stagnation, food security and climate change. By highlighting the interdependencies between marine ecosystems, human activities and socio-economic factors, the study emphasises the need for integrated approaches to the sustainable management of ocean resources. This can lead to greater collaboration between governments, industry and civil society organisations to promote responsible stewardship of the oceans and ensure the long-term success of blue economy initiatives. For policy makers, industry stakeholders and other decision makers, the study offers practical implications for the development of effective blue economy policies and strategies. The identification of prevalent research themes and clusters can serve as a basis for designing targeted policies and initiatives that address specific areas of the blue economy. In addition, the study highlights emerging trends and areas where research is currently lacking so that policy makers and stakeholders can make informed decisions about interventions and resource allocation. For researchers and practitioners working on the blue economy, the study provides valuable insights into the current state of blue economy science. By identifying prevailing research themes and clusters, researchers can focus their efforts and accelerate the growth of knowledge in the field. Practitioners, such as marine resource managers and conservationists, can use this knowledge to make informed decisions about interventions and resource allocation based on the current thematic focus.

5.4 Limitations of The Study and Directions for Further Research

The exclusive use of the Web of Science database and the keyword "blue economy" may have led to the systematic exclusion of relevant literature, resulting in possible biases. The complexity of blue economy research may not be fully captured by the factorial analysis and thematic analysis approaches used. Top-cited articles based on the number of citations do not necessarily reflect the actual importance or relevance. Interpretation of the results of big data analyses can be subjective and inconsistent from researcher to researcher. Several recommendations are made for future research: Continuing interdisciplinary knowledge sharing, innovative methods to integrate perspectives from different fields, exploring regional differences and unique contexts within the blue economy, investigating emerging topics such as blue biotechnology and circular economy principles, and development research paradigms for a sustainable blue economy that address critical knowledge gaps. Other opportunities include comparing results from different databases, conducting qualitative interviews with researchers and practitioners, examining long-term research trends over extended periods of time, and fostering interdisciplinary collaboration involving perspectives from fields such as economics, environmental science and political science. Involving different stakeholders from the outset in the formulation of research questions and the final results could lead to more participatory, comprehensive and impactful knowledge production about the blue economy and the natural world.

6. CONCLUSION

This study presents and analyses the growth, dynamics and scope of blue economy research from 2017 to 2023, making an important contribution to the literature on the blue economy and having potential implications for sustainable ocean resource management and policy making. By using Biblioshiny to facilitate a bibliometric analysis of 981 bibliographic records from the Web of Science database, comprising articles, conference papers and reviews on the blue economy, this study provided a robust and comprehensive overview of the main themes, patterns and thematic clusters within this field. The use of advanced analytical techniques such as correspondence analysis (CA), multiple correspondence analysis (MCA) and multidimensional scaling (MDS) enabled a nuanced examination of the multidimensionality and complexity of the various research topics and their interrelationships. This approach not only illuminated the wide range of different research topics within the discourse on the blue economy, but also revealed the diverse and varied nature of research on the blue economy, as evidenced by the varying degrees of "closeness" between the keywords. One of the key contributions of the study is that it highlights potential areas for further research and greater integration in the study of the blue economy. By showing the distribution and relationships between the thematic clusters, the study highlights the connections between the different research topics and the importance of certain topics within the research network. Topics such as marine ecosystems, energy, fisheries management and climate change crystallised as central areas and reflect the complexity of research in the blue economy and its importance for tackling global challenges. Furthermore, the results of the study have the potential to significantly influence the sustainable management of ocean resources and policy making. By gaining a comprehensive understanding of the research landscape, including the identification of salient issues and their interrelationships, policy makers and resource managers can make informed decisions that reflect the current state of knowledge and address the most pressing issues in the blue economy. In addition, the results of the study can assist in the allocation of resources and the development of targeted initiatives by highlighting areas of high centrality and density, such as marine, management and energy clusters. This information can inform strategic planning, investment decisions and the development of customised strategies that promote sustainable economic growth while protecting ocean resources. In addition to the practical implications, the theoretical contributions of the study should not be overlooked. Through the use of advanced factorial analysis techniques and qualitative thematic analyses, the study enhances our understanding of the complex dynamics that have driven the emergence of the blue economy and provides a roadmap for future theoretical development in this area.

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REFERENCES

[1] Okafor-Yarwood, I., Kadagi, N. I., Miranda, N. A., Uku, J., Elegbede, I. O., & Adewumi, I. J. (2020). The blue economy–cultural livelihood–ecosystem conservation triangle: The African experience. *Frontiers in Marine Science*, *7(1)*, 1-18.

[2] Phelan, A., Ruhanen, L., & Mair, J. (2020). Ecosystem services approach for community-based ecotourism: towards an equitable and sustainable blue economy. *Journal of Sustainable Tourism*, *28*(10), 1665-1685.

[3] Uddin, S. A., & Islam, M. M. (2019). Blue biotechnology, renewable energy, unconventional resources and products as emerging frontiers at Sea. *Journal of Ocean and Coastal Economics*, *6*(2), 1-26.

[4] Martínez-Vázquez, R. M., Milán-García, J., & de Pablo Valenciano, J. (2021). Challenges of the Blue Economy: evidence and research trends. *Environmental Sciences Europe*, *33*(1), 1-17.

[5] Kamalu, K., Binti Wan Ibrahim, W. H., & Umar Ahmad, A. (2022). The effect of remittance on human development in the organization of islamic cooperation member countries: Evidence from DCCE AND CS-ARDL. *Interdisciplinary Journal of Management Studies (Formerly known as Iranian Journal of Management Studies)*, *15*(2), 405-424.

[6] Atiku, A. M., Ismail, S., & Ahmad, A. U. (2021). Energy trade amidst sustainable economic growth in regional cooperation of West African States: fresh evidence from panel CS-ARDL. *International Journal of Energy Economics and Policy*, *11*(6), 262-269.

[7] Ismail, S., Roslan, F., Endut, W. A., Ismail, N. F., Atiku, A. M., & Ahmad, A. U. (2024). Causal Link between Financial Globalisation Uncertainty, Economic Growth, Environmental Degradation and Energy Consumption in ASEAN+ 3 Countries. *International Journal of Energy Economics and Policy*, *14*(1), 1-5.

[8] Rotter, A., Barbier, M., Bertoni, F., Bones, A. M., Cancela, M. L., Carlsson, J., ... & Vasquez, M. I. (2021). The essentials of marine biotechnology. *Frontiers In marine science*, *8(1)*, 1-53.

[9] Atiku, A. M., Ismail, S., Roslan, F., & Ahmad, A. U. (2022). The effect of electricity distribution loos, electricity power consumption, electricity intensity on energy consumption in West Africa. *International Journal of Energy Economics and Policy*, *12*(5), 361-369.

[10] Brodie Rudolph, T., Ruckelshaus, M., Swilling, M., Allison, E. H., Österblom, H., Gelcich, S., & Mbatha, P. (2020). A transition to sustainable ocean governance. *Nature communications*, *11*(1), 1-14.

[11] Garland, M., Axon, S., Graziano, M., Morrissey, J., & Heidkamp, C. P. (2019). The blue economy: Identifying geographic concepts and sensitivities. *Geography Compass*, *13*(7), 1-21.

[12] Lahiri, S., Snowden, B., Gu, J., Krishnan, N., Yellin, H., & Ndiaye, K. (2021). Multidisciplinary team processes parallel natural disaster preparedness and response: A qualitative case study. *International Journal of Disaster Risk Reduction*, *61(7)*, 1-9.

[13] Wang, L., Niu, W., Ding, L., & Zhao, Z. (2023). A bibliometric review on marine economy: Current status, development and future directions. *Marine Policy*, *155(9)*, 1-22.

[14] Roy, A. (2019). Blue economy in the Indian Ocean: Governance perspectives for sustainable development in the region. *ORF Occasional Paper*, *1-38*.

[15] Karani, P., & Failler, P. (2020). Comparative coastal and marine tourism, climate change, and the blue economy in African Large Marine Ecosystems. *Environmental Development*, *36(4)*, 1-9.

[16] Pan, X., Wang, M., & Pu, C. (2024). Effect of marine ecological compensation policy on coastal water pollution: Evidence from China based on a multiple period difference-in-differences approach. *Science of The Total Environment*, *923(5),* 1-11.

[17] Choudhary, P., Khade, M., Savant, S., Musale, A., Chelliah, M. S., & Dasgupta, S. (2021). Empowering blue economy: From underrated ecosystem to sustainable industry. *Journal of environmental management*, *291*, 1-16.

[18] Lee, K. H., Noh, J., Lee, J., & Khim, J. S. (2021). Blue economy and the total environment: Mapping the interface. *Environment International*, *157(12)*, 1-8.

[19] Martínez Vázquez, R. M., Milán García, J., & De Pablo Valenciano, J. (2021). Analysis and trends of global research on nautical, maritime and marine tourism. *Journal of Marine Science and Engineering*, *9*(1), 1-19.

[20] Duan, P., Cao, Y., Wang, Y., & Yin, P. (2022). Bibliometric analysis of coastal and marine tourism research from 1990 to 2020. *Journal of Coastal Research*, *38*(1), 229-240.

[21] Liu, J. M., Setiazi, H., & So, P. Y. (2023). Fisheries hydroacoustic assessment: A bibliometric analysis and direction for future research towards a blue economy. *Regional Studies in Marine Science*, *60(2)*, 1-15.

[22] Jiang, L., Yang, T., & Yu, J. (2022). Global trends and prospects of blue carbon sinks: a bibliometric analysis. *Environmental Science and Pollution Research*, *29*(44), 65924-65939.

[23] Zhong, C., Li, T., Bi, R., Sanganyado, E., Huang, J., Jiang, S., ... & Du, H. (2023). A systematic overview, trends and global perspectives on blue carbon: A bibliometric study (2003–2021). *Ecological Indicators*, *148(4)*, 1-11.

[24] Liang, J., Yin, Z., Yang, J., Li, Y., Xu, M., Li, J., ... & Niu, L. (2022). Bibliometrics and visualization analysis of research in the field of sustainable development of the blue economy (2006–2021). *Frontiers in Marine Science*, *9(3)*, 1-16.

[25] Paredes-Coral, E., Mokos, M., Vanreusel, A., & Deprez, T. (2021). Mapping global research on ocean literacy: Implications for science, policy, and the Blue Economy. *Frontiers in Marine Science*, *8(3)*, 1-12.

[26] Razmjooei, D., Alimohammadlou, M., Ranaei Kordshouli, H. A., & Askarifar, K. (2024). A bibliometric analysis of the literature on circular economy and sustainability in maritime studies. *Environment, Development and Sustainability*, *26*(3), 5509-5536

[27] Levine-Clark, M., & Gil, E. L. (2021). A new comparative citation analysis: Google Scholar, Microsoft Academic, Scopus, and Web of Science. *Journal of Business & Finance Librarianship*, *26*(1-2), 145-163.

[28] Pranckutė, R. (2021). Web of Science (WoS) and Scopus: The titans of bibliographic information in today's academic world. *Publications*, *9*(1), 1-59.
[29] Chapman, K., & Ellinger, A. E. (2019). An evaluation of Web of Science, Scopus and Google Scholar citations in operations management. *The International Journal of Logistics Management*, *30*(4), 1039-1053.
[30] Braun, V., & Clarke, V. (2022). Conceptual and design thinking for thematic analysis. *Qualitative psychology*, *9*(1), 1-24.