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INTERNATIONAL ACADEMIC RESEARCH AND STUDIES IN

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EDITORS

ASSOC. PROF. DR. ERSİN KORKMAZ

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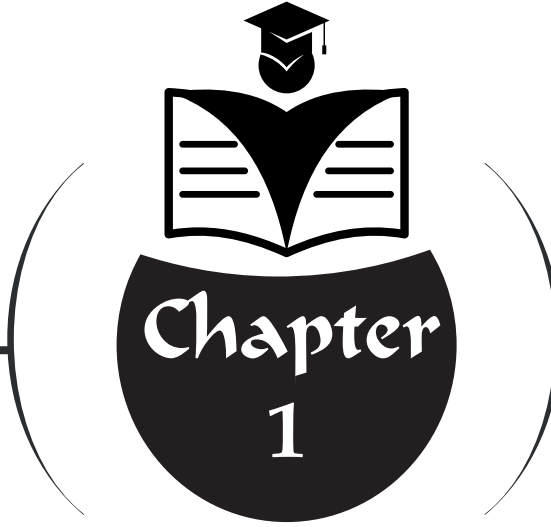
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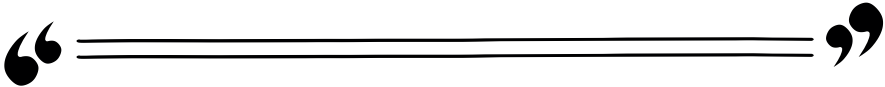
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AN EVALUATION OF THE DISTRIBUTION AND CHARACTERISTICS OF PUBLICATIONS ON FAIR TRADE IN THE WEB OF SCIENCE DATABASE



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1. Introduction

The study of the distribution and characteristics of publications on Fair Trade within the Web of Science database holds significant importance for advancing understanding in this growing field. As Fair Trade continues to gain prominence as a mechanism for promoting ethical consumption and sustainable development, systematically evaluating the existing body of research allows scholars to identify prevailing trends, research gaps, and emerging themes. Publishing in this area contributes to the consolidation of knowledge by mapping the evolution of academic interest, highlighting key authors, influential journals, and collaborative networks. Such bibliometric analyses not only provide a comprehensive overview of how the topic has been approached across disciplines but also support researchers in positioning their work within the broader scholarly conversation.

Moreover, this type of research offers practical benefits by informing policymakers, practitioners, and stakeholders about the focus areas and potential biases in current literature. Understanding the distribution of Fair-Trade research can guide future studies towards underexplored topics, enhance interdisciplinary approaches, and promote more targeted and impactful interventions. Therefore, scholarly contributions that evaluate publication patterns in Fair-Trade enrich the literature by fostering critical reflection and strategic development, ultimately supporting the advancement of Fair-Trade principles in both academic and applied contexts.

Fair-Trade is a significant topic extensively examined within academic research. In this context, the present study aims to investigate the subject of Fair-Trade in detail (Arslantürk & Aysen, 2015; Akdoğan, 2021). Through comprehensive analysis, this research seeks to contribute to the existing body of knowledge by exploring various dimensions and implications of Fair-Trade practices. By doing so, it provides a deeper understanding of the concept and its relevance in contemporary economic and social frameworks.

2. Fair Trade

Modern Fair Trade labels began in 1988 when a Dutch faith-based NGO started an initiative to ensure low-income farmers received “sufficient wages.” They created a fair trade label called Max Havelaar, named after a Dutch character who opposed exploitation of coffee pickers in colonies. Later, similar initiatives emerged across Europe and North America, like TransFair and Global Exchange. In 1997, these initiatives formed Fairtrade International, and by 2002, a common Fair Trade Certification mark was launched. Numerous Fair Trade organisations operate today. In 2012, Fairtrade International’s largest member, Transfair USA, split to form Fair Trade USA over differences about whether the label should be limited to small-scale producers. Fairtrade International favours restricting certification to small producers, while Fair

Trade USA supports certifying large producers and plantations. “Fairtrade” is used by Fairtrade International for its certification mark, whereas “Fair Trade” refers to the broader movement (Dragusanu et.al., 2014). Le Mare (2008) studied fair trade’s impact, finding it boosts social and economic development and livelihood diversification. Fair trade networks effectively promote sustainable businesses but less so in gender equality and women’s issues. Partnerships, diverse strategies, and collaboration with governments and NGOs are vital for development goals. While FT improves well-being and sustainable institutions, its complex actions lead to varied outcomes, not just marketing claims. FT benefits are significant but insufficient alone; it should be part of a broader development strategy.

Income distribution among countries is notably unequal, and this disparity has been increasing in the context of an increasingly globalized world. Within this growing trend of inequality, various ideas and approaches have been proposed to address and counteract the unequal global order. One such approach is Fair Trade. This concept particularly claims to offer significant opportunities to workers in so-called “Third World” countries. By emphasizing ethical trading practices, Fair-Trade seeks to create more equitable economic relationships and improve the livelihoods of marginalized laborers in developing regions. Consequently, it represents a response to the challenges posed by global income inequality and aims to promote social justice through more balanced international trade practices. The term “fair trade” is confusing because it refers to two different ideas. One version supports protectionist measures against cheaper imports from poorer countries, arguing trade should be level and that cheaper products should be excluded. Extreme protectionism could eliminate all trade based on comparative advantage, but in practice, it’s often used to shield domestic industries from cheaper foreign labor (Süyğün, 2015; Erol, 2017; Maseland and de Vaal, 2002).

The concept of Fair-Trade is fundamentally based on the notion that the relationship between less developed and more developed regions is often skewed to the disadvantage of the less developed. The core idea behind Fair-Trade is to promote greater equity within commercial processes. This model aims to ensure that disadvantaged groups receive a larger share of global economic opportunities, thereby fostering more inclusive and balanced development. In this context, the role of consumers is particularly significant, as their preference for products labeled as Fair-Trade directly supports producers who adhere to ethical and equitable trade practices. It is only through consumer demand for Fair-Trade goods that producers committed to this model can experience sustainable growth and development. Therefore, consumer participation and ethical consumption are integral to the success and expansion of Fair-Trade initiatives (Kalay, 2021). Maseland and de Vaal (2002) link justice to the fair trade movement, which believes trade is just when it benefits the least well-off.

Fair trade advocates see a moral duty to pursue outcome justice, often paying higher prices for goods from less developed countries. The article does not cover the other justice aspect—strict behaviour prohibitions—since they are fundamental to trade boundaries and beyond the article’s focus.

Although Fair-Trade generally enjoys a positive reputation, there remain notable doubts and concerns regarding certain aspects of its implementation. One particular area of skepticism relates to information security within the Fair-Trade process. Moreover, many companies adopt Fair-Trade practices without compromising their profit margins. However, this approach raises concerns from the perspective of consumers. The perception that companies might prioritize financial gains while claiming adherence to Fair-Trade principles leads to a sense of uncertainty and distrust among consumers, who may question the authenticity and transparency of such practices (Gedikli, 2022). Doherty et al. (2013) explore fair trade’s history and its social movement impact across seven value chains, highlighting issues like dilution, sourcing, and risks for Fair Trade Organizations (FTOs) and social actors. Empowering producers and FTOs is essential to address challenges. FTOs must guard against cannibalization by multinational brands but aim to support farmers and promote a transformative message. They rely on Fair Trade authorities to uphold principles and prevent marginalization. In developed countries, passive consumers hinder Fair Trade’s ability to reverse dilution, and many FTOs face declining supermarket sales. Community efforts, like towns and universities, help sustain independent FTOs and foster resilient markets. Gohary et al. (2023) found that conservative consumers are less likely to buy fair trade products, largely due to their Social Dominance Orientation (SDO). However, this resistance can be overcome: conservatives are more interested when fair trade appeals to their desire for superiority or is framed as supporting social inequality, not equality. They prefer fair trade products from free-market-driven markets over those with government intervention. These findings suggest marketers and policymakers should use SDO and free-market frames to better promote fair trade to conservatives.

3. Methodology

On 7 October 2025, a comprehensive search was conducted on the Web of Science database using the keyword “Fair Trade”. This search yielded 3,321 scientific publications. These publications were then filtered according to specific criteria to create a more focused dataset for analysis. Only articles written in English with an “open access” publication status were considered for evaluation in this context. The 696 academic articles that met these criteria and were deemed suitable for analysis were examined in detail in subsequent stages.

The Bibliometrix package can be used in academic research (Aria & Cuccurullo, 2017). In this study, the R programming language was utilized for conducting bibliometric analyses. Specifically, the Bibliometrix package was employed to perform literature review and data visualization tasks. All tables and graphical representations presented in the research were meticulously prepared by the author using the software, ensuring the accuracy and reliability of the analyses.

4. Data and Analysis

4.1. Main Information

The dataset covers a timespan from 1998 to 2025 and includes a total of 696 documents. These documents were sourced from 394 different publications, including journals, books, and other academic outlets. The annual growth rate of publications is reported as 15.05%, and the average age of the documents is 6.01 years. On average, each document received 26.74 citations. The total number of references listed in the dataset is 0.

In terms of document content, 1,613 “Keywords Plus” (ID) and 2,423 author-provided keywords (DE) were identified, reflecting the range of topics addressed in the publications. A total of 2,094 individual authors contributed to the documents. Among these, 120 authors wrote single-authored documents.

Regarding collaboration, there are 133 single-authored documents in the dataset. The average number of co-authors per document is 3.32. The percentage of documents involving international co-authorship is 32.47%, indicating that nearly one-third of the publications were produced through international collaboration.

Table 1. Main Information

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	1998:2025
Sources (Journals, Books, etc)	394
Documents	696
Annual Growth Rate %	15,05
Document Average Age	6,01
Average citations per doc	26,74
References	0
DOCUMENT CONTENTS	
Keywords Plus (ID)	1613
Author’s Keywords (DE)	2423

AUTHORS	
Authors	2094
Authors of single-authored docs	120
AUTHORS COLLABORATION	
Single-authored docs	133
Co-Authors per Doc	3,32
International co-authorships %	32,47

Source: Created by the author.

4.2. Annual Scientific Production

The annual distribution of publications on Fair-Trade has shown a significant increase, especially over the last 10 years. The number of articles rose from 39 in 2016 to over 70 from 2021 onwards, reaching its peak. This growth reflects the increasing importance of Fair-Trade in both academic and social contexts. The rise was further accelerated by supply chain challenges and sustainability concerns highlighted during the pandemic. Although the 2025 data is incomplete, the overall trend remains upward. In conclusion, Fair-Trade has evolved from being merely an ethical issue to a multidisciplinary and global research field.

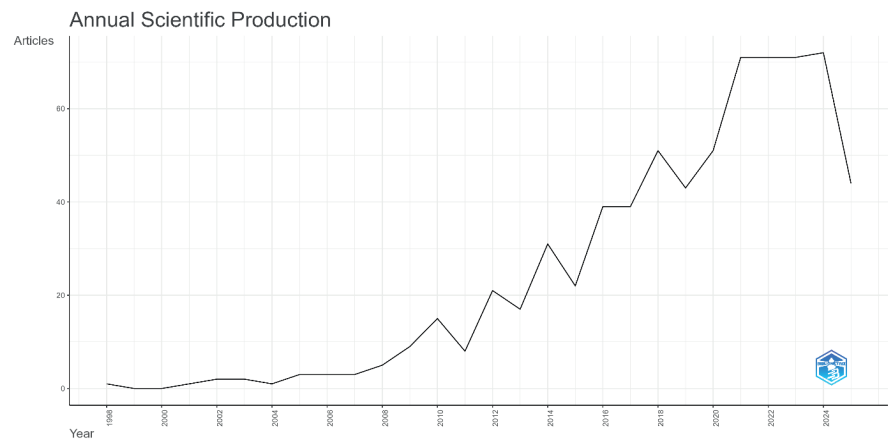


Figure 1. Annual Scientific Production

Source: Created by the author.

4.3. Most Relevant Sources

The table shows that Fair-Trade publications are concentrated in journals focused on sustainability and ethics. Sustainability leads by far with 74 articles, followed by the Journal of Business Ethics (32 articles) and Geoforum (11 articles). While other journals have fewer publications, the diversity

highlights Fair Trade's interdisciplinary nature. Journals related to food systems, rural development, environmental management, and marketing reflect growing academic interest across multiple fields. This indicates that Fair-Trade is no longer limited to ethical discussions but has expanded into a broader research area with global and sectoral relevance in sustainability, economics, and social sciences.

Table 2. *Most Relevant Sources*

Source	Articles
Sustainability	74
Journal of Business Ethics	32
Geoforum	11
Frontiers in Sustainable Food Systems	9
Journal of Rural Studies	9
Foods	8
Sustainable Development	8
Business Strategy and the Environment	7
Ecological Economics	7
Journal of Political Ecology	7
World Development	7
International Journal of Consumer Studies	6
Journal of Cleaner Production	6
Plos One	6
Corporate Social Responsibility and Environmental Management	5
Food Policy	5
Heliyon	5
International Food and Agribusiness Management Review	5
Journal of Agriculture Food Systems and Community Development	5
Journal of Marketing Management	5

Source: Created by the author.

4.4. Corresponding Author's Countries

The table shows that the United Kingdom leads in Fair-Trade publications with 108 articles (15.5%), followed by the USA with 78 articles (11.2%). These two countries are the primary academic contributors to the field. Germany (60 articles) stands out for its strong international collaboration, with a high percentage of multiple country publications (MCP 43.3%). Spain also shows a notable level of international cooperation (MCP 45.7%). Overall, European countries dominate Fair-Trade research, reflecting their strong focus on sustainability, ethical trade, and global development issues.

Table 3. Corresponding Author's Countries

Country	Articles	Articles %	SCP	MCP	MCP %
United Kingdom	108	15,5	75	33	30,6
USA	78	11,2	56	22	28,2
Germany	60	8,6	34	26	43,3
Netherlands	44	6,3	30	14	31,8
Italy	41	5,9	32	9	22
Spain	35	5	19	16	45,7
China	34	4,9	24	10	29,4
Belgium	25	3,6	17	8	32
France	20	2,9	14	6	30
Korea	16	2,3	15	1	6,3

Source: Created by the author.

4.5. Countries’ Scientific Production

In the field of Fair-Trade publications, the United Kingdom stands out as the clear leader. With a total of 267 publications, the United Kingdom holds the top position, demonstrating its strong academic and policy influence in this area. Its historical experience in trade and leadership in ethical commerce have established the country as a pioneer in Fair-Trade research and discourse.

Following the United Kingdom, the United States, Germany, and China rank highly, reflecting their significant economic strength. The USA holds second place with 231 publications, while Germany and China follow with 130 and 105 publications respectively. These countries contribute substantially to both the academic and commercial aspects of Fair Trade.

From a continental perspective, European countries dominate Fair-Trade publications. The prominent presence of the United Kingdom, Germany, Italy, the Netherlands, Spain, and France indicates Europe’s high level of engagement and leadership in this field. North America is well represented by the USA and Canada, while Asia shows a growing presence through countries like China, South Korea, and India. South America, Africa, and Oceania are represented by countries such as Brazil, Colombia, South Africa, and Australia, though their representation is comparatively smaller.

Developed economies play a more active role in Fair-Trade research and publications. Countries like the United Kingdom, USA, Germany, the Netherlands, Switzerland, France, and Japan rank among the top, leading efforts to investigate and promote sustainable and ethical trade practices. This trend reflects the priority and resources that developed countries allocate to advancing Fair-Trade principles.

Table 4. *Countries' Scientific Production*

Country	Freq
United Kingdom	267
USA	231
Germany	130
China	105
Italy	94
Netherlands	80
Spain	80
France	71
Belgium	49
Brazil	46
Australia	37
South Korea	37
India	35
Switzerland	33
Indonesia	31
Canada	30
South Africa	30
Mexico	25
Portugal	25
Colombia	22
Sweden	20
Finland	18
Japan	15
Czech Republic	13
Malaysia	13

Source: Created by the author.

4.6. Most Frequent Words

In academic and industry publications related to Fair Trade, the most frequently used keywords reflect a strong focus on sustainability, ethics, and supply chain management. The high occurrences of “Fair Trade” (131) and “fairtrade” (21) clearly highlight the central theme of these works, emphasizing the core concept and practice of Fair-Trade itself.

Keywords like “sustainability” (57), “sustainable development” (13), and “sustainable consumption” (12) underline the sector’s commitment not only to economic justice but also to long-term environmental balance and social

progress. The presence of “certification” (40) and “sustainability standards” (8) signals the importance of mechanisms that ensure credibility and market acceptance within Fair Trade.

Consumer-related terms such as “ethical consumption” (30), “consumer behavior” (12), “purchase intention” (8), and “willingness to pay” (16) indicate a strong interest in understanding buyers’ attitudes and behaviors toward Fair-Trade products. These insights are crucial for assessing market growth potential driven by ethical consumerism.

Terms like “corporate social responsibility” (18), “social enterprise” (10), and “ethics” (8) reveal that Fair-Trade extends beyond consumer choices to include companies’ social responsibilities and ethical business models.

Industry-specific keywords such as “coffee” (26), “cooperatives” (15), “global value chains” (13), and “supply chain” (8) emphasize the sector’s focus on agricultural products and producer empowerment through global trade networks.

Lastly, “organic” (17) and “alternative food networks” (8) connect Fair-Trade with natural and alternative food systems, highlighting the growing importance of sustainable and ethical food consumption.

Overall, the keyword analysis shows that Fair-Trade publications integrate social, environmental, and economic dimensions to promote a holistic, sustainable trade model.

Table 5. *Most Frequent Words*

Words	Occurrences
Fair Trade	131
Sustainability	57
Certification	40
Ethical Consumption	30
Coffee	26
Fairtrade	21
Corporate Social Responsibility	18
Organic	17
Willingness to Pay	16
Cooperatives	15
Global Value Chains	13
Sustainable Development	13
Consumer Behavior	12

Sustainable Consumption	12
Social Enterprise	10
Consumer Behaviour	9
Food Security	9
Alternative Food Networks	8
Ethics	8
Purchase Intention	8
South Africa	8
Supply Chain	8
Sustainability Standards	8

Source: Created by the author.

4.7. Collaboration Network

The Country Collaboration Network data (Table 6): Starting with the clusters, Cluster 1 consists mainly of Spain and Latin American countries. Spain plays a central role in this group, likely due to historical and cultural ties with these nations. Spain's high betweenness and PageRank values indicate that it acts as a key hub facilitating collaborations among Latin American countries, while these countries generally have lower centrality values, suggesting a less prominent role in the global trade network.

Cluster 2 stands out as the most populous and central cluster in the global trade network. It includes economically powerful countries such as the USA, United Kingdom, Germany, China, and others. The USA and United Kingdom, with their very high betweenness and PageRank scores, act as major hubs and bridges in this network. European economic powerhouses are also part of this cluster, highlighting Europe's strong trade cooperation. Additionally, large Asian economies like China and India are included, underscoring the importance of Asia in global trade and collaboration. This cluster clearly reflects the dominance of developed countries in global trade networks.

The third group, Cluster 3, mainly consists of countries such as Belgium, Indonesia, and South Africa. This cluster reflects more regional or less intense trade collaborations. The countries here have fewer connections and a lower degree of centrality in the global network. Belgium, Indonesia, and South Africa are relatively more central within this cluster but still far less influential than those in Cluster 2. This suggests more localized or emerging trade partnerships rather than global leadership roles.

The remaining clusters consist of smaller or less connected countries such as Peru, Ecuador, Czech Republic, Austria, Poland, Türkiye, Nigeria, Cyprus, and Romania. These countries tend to have lower interaction levels in the trade network and appear somewhat isolated or peripheral in terms of global

trade connections. This reflects smaller or more localized trade partnerships without significant global influence.

In terms of inter-country cooperation, the USA and United Kingdom clearly dominate the global trade network, serving as the main hubs and key connectors. European countries show dense internal collaborations, forming a strong regional trade network. Large Asian economies such as China and India integrate into this network and hold important roles in both regional and global trade. Latin American countries appear more interconnected among themselves and with Spain but have limited broader global connections. African countries generally have fewer connections and play a more peripheral role in the global trade network.

When analyzing developed countries and continents, North America stands out with the USA exhibiting very high centrality, while Canada and Mexico are part of the strong collaborative network centered around the USA. Europe demonstrates a robust role with many countries cooperating closely in the trade network. Asia features key players like China, India, Japan, and Singapore, though their centrality is slightly lower compared to Europe and North America. South American countries are clustered regionally with limited global connectivity. African nations have low centrality and interaction, indicating marginalization in the global trade structure.

Table 6. *Country Collaboration Network*

Node	Cluster	Betweenness	Closeness	PageRank
Spain	1	32,589	0,013	0,033
Colombia	1	8,285	0,012	0,02
Chile	1	0	0,01	0,006
Costa Rica	1	2,362	0,011	0,01
Argentina	1	0,397	0,01	0,007
United Kingdom	2	281,292	0,018	0,099
USA	2	208,336	0,016	0,095
Germany	2	95,879	0,016	0,06
China	2	19,644	0,014	0,041
Italy	2	5,534	0,013	0,029
Netherlands	2	36,065	0,014	0,05
France	2	24,858	0,014	0,032
Brazil	2	13,037	0,014	0,037
Australia	2	18,384	0,014	0,03
Korea	2	0	0,01	0,006

India	2	2,614	0,013	0,022
Switzerland	2	5,018	0,013	0,028
Canada	2	0,505	0,013	0,022
Mexico	2	10,354	0,013	0,029
Sweden	2	2,967	0,013	0,018
Finland	2	0,034	0,011	0,009
Japan	2	2,952	0,013	0,024
Malaysia	2	0,03	0,01	0,007
Norway	2	1,696	0,012	0,017
Ghana	2	0,054	0,011	0,009
Kenya	2	0	0,01	0,006
Singapore	2	2,732	0,014	0,026
Cameroon	2	0	0,011	0,011
Nicaragua	2	0	0,01	0,006
Belgium	3	48,633	0,014	0,03
İndonesia	3	38,681	0,014	0,034
South Africa	3	22,113	0,014	0,03
Portugal	3	0,015	0,011	0,007
Denmark	3	0,104	0,012	0,009
Vietnam	3	0,244	0,012	0,011
New Zealand	3	0,078	0,011	0,01
Ethiopia	3	0	0,01	0,006
Hungary	3	0,051	0,011	0,01
Peru	4	0,601	0,011	0,01
Ecuador	4	0,185	0,01	0,009
Czech Republic	5	45	0,01	0,01
Austria	6	2,675	0,011	0,011
Poland	7	0	0,007	0,005
Türkiye	8	0	0,01	0,005
Nigeria	9	0	0,01	0,005
Cyprus	10	0	0,01	0,005
Romania	11	0	0,01	0,005

Source: Created by the author.

5. Discussion and Conclusion

Between 1998 and 2025, there has been a steady increase in academic interest in the topic of “Fair Trade”. With an annual growth rate of 15.05%, it is clear that this subject is becoming increasingly popular within academia.

The international co-authorship rate of 32.47% suggests that the issue is being addressed globally. The average number of citations (26.74) suggests that these studies have attracted attention within the literature. The data reveal that the field of “Fair Trade” is interdisciplinary and open to collaboration, emphasising the importance of scientific research in this area.

The number of Fair-Trade publications has significantly increased over the past decade, peaking after 2021. This growth highlights rising academic and societal interest, driven by sustainability and pandemic-related supply chain issues. Fair-Trade is now recognized as a global, multidisciplinary research area beyond its ethical origins.

Fair-Trade has grown beyond its ethical roots to become a broad, interdisciplinary research field. The wide range of journals publishing on the topic-spanning sustainability, food systems, business, and rural studies-shows its increasing academic relevance. This shift reflects global concerns around sustainability, equity, and responsible consumption, confirming Fair Trade’s importance as a key subject in both scholarly and practical discussions.

The data highlights the dominance of European countries, especially the UK and Germany, in Fair-Trade research. High international collaboration rates, particularly in Germany and Spain, reflect the global and interdisciplinary nature of the field, emphasizing the growing academic commitment to sustainability and ethical trade practices worldwide.

The United Kingdom leads Fair-Trade publications with 267 entries, highlighting its strong influence and leadership in ethical trade. The USA, Germany, and China follow, reflecting their economic strength and growing focus on Fair Trade. Europe dominates the field, with significant contributions from North America and a rising presence from Asia. Developed economies, such as the United Kingdom, USA, and Germany, are most active in advancing Fair-Trade research and practices, emphasizing their commitment to sustainable and ethical commerce worldwide.

The keyword analysis reveals that Fair-Trade research strongly emphasizes sustainability, ethical consumption, and certification processes. Central themes include consumer behavior, corporate social responsibility, and supply chain transparency, highlighting the sector’s holistic approach to social and environmental justice. Agricultural products like coffee and the role of cooperatives are prominent, reflecting a focus on producer empowerment in global value chains. Additionally, connections to organic and alternative food networks suggest an expanding interest in sustainable food systems. Overall, Fair-Trade literature integrates economic, social, and environmental goals to promote responsible and equitable global trade.

The Country Collaboration Network reveals distinct patterns of trade

cooperation shaped by historical, economic, and regional factors. Spain's pivotal role in Cluster 1 highlights its strong cultural and economic ties with Latin American countries, though these nations exhibit limited global influence compared to developed economies. Cluster 2 is the core of global trade, dominated by highly developed countries like the USA, United Kingdom, Germany, and China, which act as key hubs and bridges within the network. This cluster reflects the concentration of economic power and international trade leadership. Europe's strong presence across multiple clusters underlines its deep intra-continental collaborations and influence in global markets. Asian countries such as China, India, and Japan play significant roles but have relatively lower centrality compared to North American and European counterparts. Clusters involving emerging or developing countries, including parts of Africa and smaller economies, show weaker integration into global trade networks, highlighting ongoing disparities in global economic participation. The network structure underscores the dominance of developed countries in shaping global trade flows, with clear regional clusters reflecting economic alliances and historical ties. Addressing the marginalization of less connected regions like Africa could enhance inclusivity and global trade resilience. Overall, the analysis emphasizes the importance of strengthening cross-cluster collaborations to foster more balanced and diversified international trade networks.

Explanations

Ethical Approval

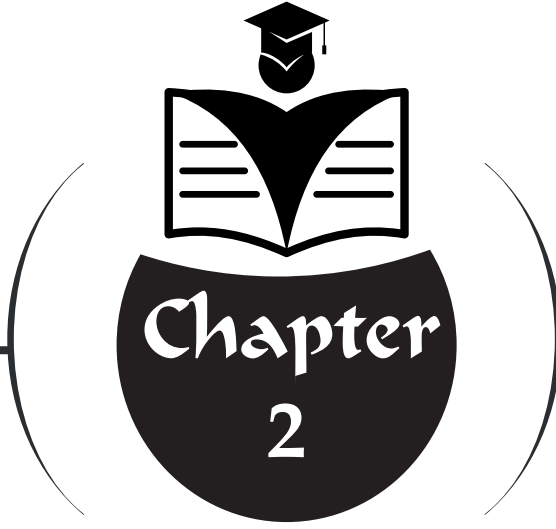
This study utilized secondary data sources and did not involve direct participation or intervention with human subjects. Therefore, ethical approval was not required.

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BLUE ECONOMY FOR ACHIEVING SUSTAINABLE DEVELOPMENT GOALS: AN EVALUATION OF TURKIYE

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Introduction

The blue economy refers to economic activities related to seas and oceans. A large part of the world's surface area is covered with water. There are many water-based activities, and their impacts on economic and social life are extremely important. Sectors such as fishing and aquaculture, tourism, maritime transportation, and shipbuilding are within the blue economy's scope. These sectors stand out for their contribution to gross domestic product, employment creation opportunities, and increasing global competitiveness. Sectors based on the blue economy attract attention not only for their economic and social impacts but also for their impact on the environment and sustainable development. Developing a blue economy and protecting aquatic life are sustainable development goals. The continuity of the ecological balance is possible by reducing air, soil, and water pollution together. In other words, air, soil, and water pollution should be reduced simultaneously.

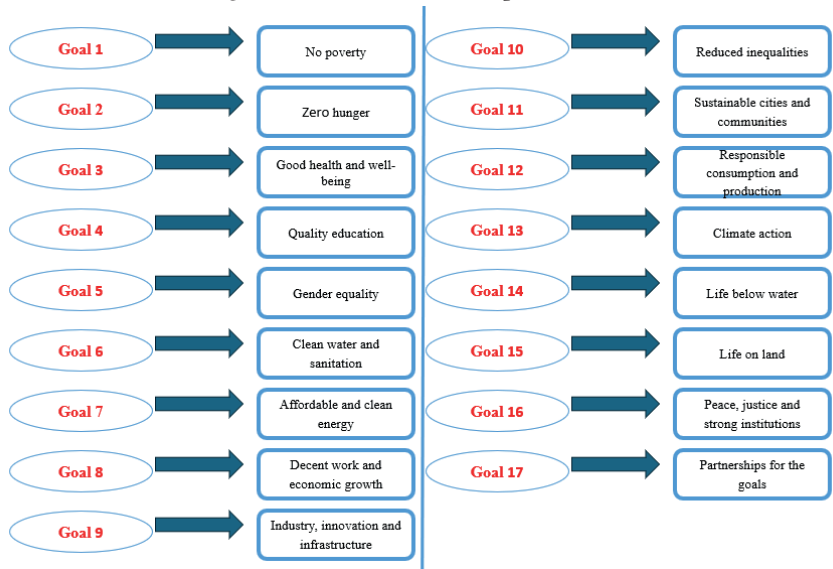
With sustainable development goals, more attention has been drawn to the importance of aquatic life. Developing blue economy-based activities, especially for countries bordering the sea or ocean, contributes to their economic growth and sustainable development goals. In this study, the concept of the blue economy was focused on as one of the sustainable development goals, and future policy recommendations were made by examining the changes in blue economy indicators in Türkiye over time. Türkiye is a country surrounded by seas on three sides, with long coastal areas and many port cities. Türkiye is a country with high potential for a blue economy due to its natural features and geographical and geopolitical location. It is crucial for Türkiye's future to capitalize on its potential and develop blue economy-based sectors, thereby increasing their economic contribution. However, to shape blue economy policies correctly, the country's current situation must first be evaluated, its shortcomings must be identified, and the aspects that need further development must be revealed. For this purpose, the concept of the blue economy was first mentioned in the study, and the connection between the blue economy and sustainable development was explained. The next section provides information about the advantages and disadvantages of the blue economy. Then, some indicators related to the blue economy were examined, and data for Türkiye were presented. Care was taken to select indicators from different dimensions of the blue economy, such as production, foreign trade, maritime transportation, and access to water resources. In this context, the indicators of marine aquaculture, export and import values of marine products, the share of maritime transport in total freight transport, and the proportion of the population not using improved water resources were examined for Türkiye. In the last part of the study, the policies that will develop the blue economy and enable the sectors related to the blue economy to move forward are explained.

Sustainable Development Goals

Sustainable development has been an important research topic in recent years and continues to maintain its relevance. For many years, countries' sole and primary goal has been to achieve economic growth. The fact that countries have ignored environmental issues at the expense of achieving economic growth has resulted in many problems, especially environmental ones (Hariram et al., 2023). For rapid economic growth, natural resources have been consumed rapidly, water resources have been polluted, soil pollution has increased, and health problems of global proportions have emerged. Along with these problems, social inequalities and poverty have increased. The population that cannot access basic needs such as food, education, health, and infrastructure services has increased (Mishra et al., 2024). The main reasons for the emergence of the concept of sustainable development are the rapid increase in environmental problems and the fact that this increase has reached dimensions that threaten the lives of all living things, especially humans. However, sustainable development is not limited to the environmental dimension alone. Sustainable development has three dimensions: environmental, economic, and social. The main purpose of this study is to ensure balance between these three dimensions and to give importance to each dimension (Chenary, Pirian Kalat, & Sharifi, 2024). The inclusion of different dimensions makes it difficult to define sustainable development. The concept of sustainable development was first defined in the Brundtland Report, which was published in 1987. The Brundtland Report, published by the World Commission on Environment and Development, emphasized the aspect of sustainable development that ensures equal opportunities between generations. According to this definition, sustainable development is a development model that "meets the needs of present generations without hindering the needs of future generations." After defining the concept in this way, different definitions of sustainable development have been made in the following years. Each definition emphasizes a different aspect of the concept and reveals the comprehensive structure of sustainable development (Mulero et al., 2024).

The Brundtland Report also has an important place in the process of determining sustainable development goals, as it clearly defines sustainability. Efforts towards sustainable development have continued to increase since the publication of the report. The publication of the Brundtland Report in 1987, the Rio Earth Summit in 1992, the Millennium Development Goals in 2000, and the Rio+20 Conference in 2012 are important international steps taken towards sustainable development (Leal Filho, Manolas and Pace, 2015). In 2015, the United Nations determined the sustainable development goals. The sustainable development goals consist of 17 targets. The United Nations has proposed 169 sub-goals related to these goals and 230 indicators to monitor whether the goals have been achieved (Barbier and Burgess, 2017).

Figure 1. Sustainable Development Goals



Source: Sachs, 2015.

As shown in Figure 1, sustainable development goals are not only aimed at reducing the effects of climate change and environmental degradation. They also include economic and social components such as poverty, education quality, gender inequality, institutional quality, healthy living, and economic growth (Ariansyah et al., 2024). The fact that the goals have economic, social, and environmental dimensions demonstrates the importance of harmony between humans and nature. Humans are social beings with constantly increasing and diversifying needs. People use natural resources to meet these needs and their activities affect nature. In other words, humans and nature are in mutual interaction. Therefore, mutual adaptation is necessary for this relationship to be sustainable. People should use natural resources in the most efficient way, considering that future generations will also need these resources. They should minimize the environmental damage caused by their production activities (Henderson and Loreau, 2023). For this to happen, individuals, policy makers, and companies must act in coordination. Since the basis of production processes depends on the activities of companies, the contribution of companies is critical in achieving sustainable development goals. The sustainable development goals also emphasize the importance of cooperation. Just as cooperation between individuals, policy makers, and firms is needed, cooperation between countries is also needed. All countries should aim to achieve sustainable development goals and adopt sustainability as a fundamental principle (Dulume, 2019). Sustainable development is a transformative and changing process that requires both individual and international efforts (Sorooshian, 2024). This process has a dynamic

structure. New strategies, tools, and business models must be developed to achieve sustainable development goals. However, updating and diversifying the indicators used to monitor whether the targets have been achieved is an important part of this process (Ali et al., 2023).

The sustainable development goals emphasize the importance of seas and oceans in economic and social development. Goal 14 is called “life below water.” This goal focuses on the role of water resources in sustainable development. Reducing pollution in seas and oceans, protecting the diversity of aquatic life, developing the fishing sector, and efficient use of water resources are the basic elements of this goal (Andriamahefazafy et al., 2022). These elements are closely related to the “blue economy” concept.

Blue Economy

Achieving high economic growth rates is a fundamental goal for all countries. To achieve this goal, countries have created various policies and acted in accordance with certain strategies. Many concepts that determine the outlines of the growth process have entered the literature within the scope of the research conducted and the policies implemented (Guang-Wen et al., 2023). In recent years, concepts emphasizing the harmony between economic and environmental objectives have emerged. One of these concepts is the green economy. A green economy is a concept that includes economic, social, and environmental goals. It aims to avoid harming the environment during the economic growth process, to use resources efficiently, and to ensure that growth benefits everyone. Recently, a concept that adopts the basic principles of green growth and extends these principles to the seas and oceans has emerged. This concept is called the “blue economy” (Picken, 2025).

The emergence of the blue economy concept dates back to 2012. At the 2012 United Nations Conference on Sustainable Development held in 2012, it was stated that sustainability should include seas and oceans and the importance of life under water was emphasized (Smith-Godfrey, 2016).

Land covers approximately 30% of the Earth’s surface, and water covers 70%. Water is an indispensable element for the continuation of life and ecological balance. The seas and oceans are home to thousands of living species, which are a source of food for humans and animals. In addition to ecological balance, seas and oceans are also crucial for economic life continuity and development. Water is used in energy production. Moreover, hydro energy is a good alternative to fossil fuels as a renewable energy source. Coastal cities also play a role in the development of trade and tourism (Sakhujia, 2015). Maritime tourism has a high share of world trade. The seas and oceans are prominent in world trade in terms of both the goods and services subject to trade and the type of transportation. Sectors such as fishing and shipbuilding contribute to economic growth by creating added value and supporting unemployment

policies by creating employment. The tourism sector has a large share in the GDP of countries, and countries with coasts have a high potential to attract tourists. Seas and oceans are intertwined with the economy and social life for reasons such as being a food source, a habitat for living things, contributing to trade and tourism, and supporting economic growth. Therefore, the concept of the blue economy, which emerges as a growth approach in which seas and oceans are included in development plans, is becoming more important (Rayner, Jolly, & Gouldman, 2019).

Since the blue economy is a comprehensive concept, it does not have an absolute definition. Different definitions of the blue economy exist in the literature. However, even if there are differences in definitions, the basic principles of the blue economy are valid in all definitions. In addition, the scope of the blue economy is changing and expanding depending on the developments. Therefore, the definitions need to be updated. For example, there are changes in the relationship between seas and oceans and humans depending on technological developments, people's needs, and consumption habits. To respond to these changes, changes in economic policies and development approaches are necessary. This creates a need to update the definition and scope of concepts such as blue economy, green economy, and sustainable development (Spalding, 2016). There are various international organizations that define the blue economy, and each one emphasizes a different aspect of the concept. For example, the European Commission has provided a very general definition. According to the European Commission, the blue economy refers to all economic activities related to the seas, oceans, and coasts. On the other hand, the World Bank draws attention to the harmony of the blue economy between economic, social, and environmental goals. According to the World Bank, the blue economy is a form of development that ensures economic growth while also ensuring the efficient use of water resources, preserving ecological balances, and increasing welfare. The Commonwealth of Nations states that a blue economy contributes to resource efficiency. According to the Commonwealth of Nations, the blue economy enables more efficient use and better management of marine and ocean resources. One of the common views in the definitions is that the blue economy aims to increase welfare and reduce social inequalities. In doing so, it considers the existence of scarce resources, uses resources efficiently, and minimizes environmental risks (Steven, Vanderklift, & Bohler-Muller, 2019). Since the blue economy is a comprehensive concept, it interacts with many sectors. Various sectors, such as fishing, aquaculture, maritime transport, tourism, shipbuilding, and maritime trade, are closely linked to the blue economy. Since there are many sectors with which it interacts, the number of stakeholders is also high (Manzli et al., 2025). All stakeholders must adopt the basic principles of this process and adapt to the blue economy approach to achieve the blue economy goals.

Although the blue economy has advantages, it also has disadvantages and challenges. Stakeholders must act together to overcome the challenges and find solutions to the problems. Stakeholder participation, joint action, and coordination among stakeholders should be ensured (Elegbede et al., 2025).

Opportunities and Challenges

Creating a structure that considers the basic principles of the blue economy has become one of the main goals of countries. Establishing a system based on the blue economy, especially for countries bordering the sea and ocean, offers various growth and development opportunities. The blue economy provides many economic, social, and environmental advantages. The blue economy plays a role in improving the welfare of the region's people (Bari, 2017). There are dozens of economic activities related to the blue economy, including fishing, aquaculture, maritime transportation, and maritime trade. These activities contribute to the national economy by creating added value and playing an important role in combating regional unemployment by creating new job opportunities. The created job opportunities help people have a regular income, fight poverty, and live in better conditions (Voyer et al., 2018).

The blue economy also stands out for its contribution to ensuring food security. The world population is increasing, and meeting the food needs of the growing population is becoming more difficult. In this context, aquatic creatures have become more important in meeting the increasing food demand. The more water pollution is reduced, the more efficiently water resources are used, and the more suitable the habitats of aquatic creatures are made, the more food sources can be obtained (Techera, 2018). Aquaculture and aquatic organisms not only provide a food source but also contribute to the development of different sectors. More than 80% of aquaculture resources are spent on human consumption (Narwal et al. 2024). However, aquaculture products are used for many industrial and biotechnological purposes such as fertilizers, pharmaceuticals, antibiotics, nutritional supplements, cancer drugs, and animal feed. Seaweed is an important source of biofuel. Therefore, the development of the blue economy and the efficient use of water resources positively affect not only fishing and maritime trade sectors but also food, pharmaceuticals, biomedical, and renewable energy sectors. These sectors encourage innovation and increase R&D activities. As more water resources and aquatic creatures are protected, more marine and ocean-related sciences are open to development and innovation (Hussain et al., 2018).

The blue economy helps ensure not only food security but also energy security. The use of fossil resources is at high levels worldwide. Even if countries have made certain progress in transitioning to renewable energy sources, their dependence on fossil fuels continues. However, since fossil fuels

are scarce and doomed to depletion, renewable energy sources are needed. Seas and oceans and other water resources are resources for hydro energy production. By using these resources, countries bordering the seas and oceans can reduce their energy imports and dependence on foreign energy, produce lower-cost energy, and reduce the damage they cause to the environment. The blue economy is also important for countries' sustainable development and energy policies (Asif, 2022).

The blue economy also attracts attention with its contributions to the tourism sector's development. The cleaner the seas, oceans, and coastal areas, the more intense the tourism activities in these regions. Preserving the diversity of life in waters and not disturbing the natural state of the coasts positively affects tourism activities and increases interest in coastal areas (Reddy and Sailesh, 2024).

Although the blue economy offers many advantages, it also faces various challenges. The adoption of sustainability principles, well-functioning institutional structures, and an effective legal system are needed to achieve the goals related to the blue economy. Governance-related problems are an obstacle to the blue economy. Dumping industrial waste into rivers and seas, overfishing, and non-compliance with hunting bans causes water pollution. Water pollution reduces aquatic life diversity, makes access to clean drinking water and utility water difficult, and harms coastal tourism. To prevent these violations, legal regulations should be established, strict inspections should be conducted to ensure compliance with the regulations, and criminal sanctions should be imposed on those who violate the laws. Problems with institutional structures and management hinder blue economy goals (Askari, Tahir, & Shaheen, 2020).

Another challenge facing the blue economy is the negative impacts of climate change. The ecological balance is a whole with terrestrial life, underwater life, and air quality. Therefore, it is not possible to protect water resources in an environment where trees and forests are not protected, human and animal health is at risk, and air pollution is high. In the blue economy process, other elements of the environment as well as underwater life must be given importance. Achieving all of these together causes difficulties for countries (Elisha, 2019).

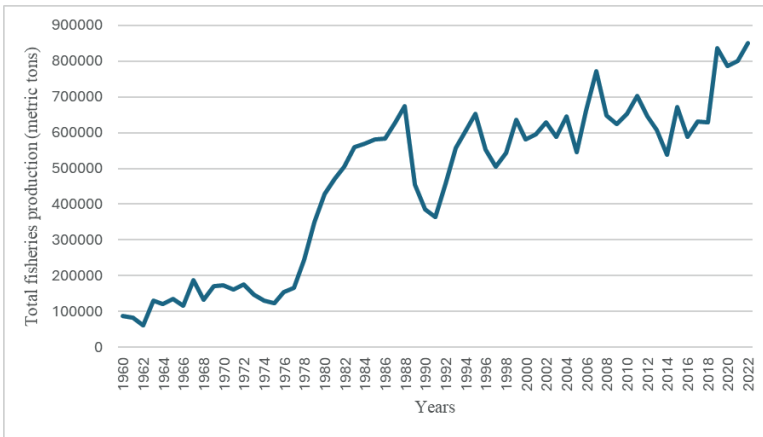
High costs and financing difficulties also pose obstacles to a blue economy. As previously mentioned, marine aquaculture interacts with many sectors. Seafood contributes to the development of sectors such as the pharmaceutical, chemical, food, and cosmetics industries. However, new investments, R&D activities, and more capital are needed for the development of these sectors. Developed financial systems and credit markets are necessary to provide the necessary financing. This situation poses a challenge for countries with insufficient financial development and depth (Phang et al., 2023).

The Blue Economy in Türkiye

The blue economy is a comprehensive and dynamic concept that is open to change and development. For this reason, there are no standard variables to measure the blue economy. New indicators reflecting the blue economy are being added and updated. However, when the main sectors associated with the blue economy are considered, indicators on fishing and mariculture production, seafood export and import, maritime transportation, and maritime tourism come to the fore. In addition to these activities, indicators such as marine resource cleanliness and access to water resources are also important for the blue economy and aquatic life. In this part of the study, some indicators related to the blue economy will be examined for Türkiye, and the current situation of the blue economy in Türkiye will be reflected. Aquaculture production, foreign trade, maritime transport, and the population not using developed water resources are the indicators to be examined.

Figure 2 shows data on total fishery production in Türkiye between 1960 and 2022. Total fishery production is the sum of the products obtained from mariculture, aquaculture, and other fish farms. Figure 2 shows that fishery production in Türkiye has gradually increased over time. Fish production in 1960 was 87860 metric tons. Although there was a gradual increase between 1960 and 1975, fishery production accelerated after 1975. This momentum continued until 1988. Fishery production increased from 122494 metric tons in 1975 to 428225 metric tons in 1980 and 674004,5 metric tons in 1988. After 1988, a fluctuating trend of increases and decreases was experienced after 1988. However, the decreases were temporary, and production increased again after the decrease. The total fishery production in Türkiye is 785815,88 metric tons, 799844 metric tons and 849825,9 metric tons in 2020, 2021, and 2022, respectively.

Figure 2. Total production of fisheries (metric tons) (1960-2022)



Source: World Bank Data

Foreign trade is an important element of economic and social life. Exports are a source of income for countries. Export revenues increase countries' national income, create resources for new investments and help maintain the balance of payments. Thus, new employment opportunities emerge, and individuals' income levels increase. The goods and services needed by the country are supplied through imports. Countries have many export items. Different export classifications are based on technology intensity and types of goods and services. Export items also include aquaculture exports. Export data on aquaculture products provide important information about countries' blue economy performance. As aquaculture exports increase, the country's GDP and competitiveness will also increase. Similarly, import data on aquaculture products and the export-import balance provide insight into how a country uses its aquaculture resources and whether it is using existing resources effectively. Table 1 shows Türkiye's aquaculture export and import data for the last 10 years. According to the table, aquaculture exports in Türkiye have increased over time. In 2015, aquaculture exports totaled 696,706 thousand dollars. The export value was \$1,063,203,000 in 2020 and \$1,712,594,000 in 2023. The export value in 2024 was \$2,029,053,000, the highest value in aquaculture exports between 2015 and 2024. The steady increase in exports over time does not apply to imports. Increases and decreases in imports have been observed on an annual basis. For example, while aquaculture imports were \$263,050,000 in 2015, this value decreased to \$189,426,000 in 2016 and rose again to \$237,065,000 in 2017. A similar situation prevailed after 2017. However, exports exceeded imports every year in the table.

Table 1. *Aquaculture foreign trade data (Thousand US \$) (2015-2024)*

Years	Export	Import
2015	696 706	263 050
2016	789 357	189 426
2017	855 358	237 065
2018	952 340	198 812
2019	1 017 413	199 194
2020	1 063 203	163 866
2021	1 375 012	222 519
2022	1 655 420	324 224
2023	1 712 594	292 917
2024	2 029 053	304 701

Source: Turkish Statistical Institute (TURKSTAT)

Note: Fish, crustaceans, molluscs and aquatic invertebrates and their preparations

The transportation sector is another sector linked to the blue economy. The transportation sector's importance has increased because of the globalization process removing barriers to foreign trade. Maritime transportation is one of the most widely used modes of transportation. Developing maritime transport and increasing competitiveness in this area contributes to achieving the goals of the blue economy. Tables 2 and 3 provide information on the types of transport used in freight transport in Türkiye. Table 2 shows the types of transportation used to transport export cargo. The data covers the years 2014-2023. According to the table, maritime transport has the highest share of export cargo transportation. The transportation type with the lowest share is air transportation. The maritime transport share did not fall below 75% between 2014 and 2023. In the 2019-2022 period, it is 80%. Maritime transport is followed by road transport, but the share of road transport is below 25%. This share did not exceed 20% between 2018 and 2022. The air transport share was 1% in 2022 and 2023. It was below 1% in the other years.

Table 2. *Distribution of exports by transportation type (%) (2014-2023)*

Years	Mode of transportation			
	Sea transportation	Road transport	Air transportation	Other*
2014	75,0	23,3	1,1	0,7
2015	75,1	23,1	1,1	0,7
2016	76,7	21,7	0,8	0,7
2017	77,7	20,7	0,8	0,9
2018	79,4	19,0	0,8	0,7
2019	80,9	17,5	0,9	0,7
2020	82,0	16,7	0,4	0,9
2021	80,8	17,7	0,5	0,9
2022	80,0	18,3	0,7	1,0
2023	78,8	19,3	0,9	1,0

Source: Ministry of Transport and Infrastructure, Republic of Türkiye

* Other: Includes railway, pipeline, postal transportation, electric power transmission, and self-propelled vehicles.

Data on import freight transport are similar to data on export freight transport. As shown in Table 3, the highest share in import transportation belongs to maritime transportation, and the lowest share belongs to air transportation. However, the share of maritime transport in import transportation is over 90%. The year in which the share of land transportation was highest between 2014 and 2023 was 2023, with a 6.2% share. Air transport, on the other hand, holds a negligible share of import freight transport. This share was 0.1% between 2014 and 2023, except for 2020.

As can be seen, maritime transport has a large share of freight transport. Developing maritime transport can enable countries to gain cost advantages in their foreign trade and increase their transportation sector competitiveness.

Table 3. *Distribution of imports by transportation type (%) (2014-2023)*

Mode of transportation				
Years	Sea transportation	Road transport	Air transportation	Other*
2014	94,0	4,1	0,1	1,9
2015	94,8	3,8	0,1	1,4
2016	95,2	3,8	0,1	0,9
2017	94,9	4,0	0,1	1,1
2018	94,9	4,3	0,1	0,7
2019	94,3	4,3	0,1	1,3
2020	93,5	4,3	0,0	2,2
2021	92,6	5,3	0,1	2,1
2022	91,9	6,1	0,1	2,0
2023	93,0	6,2	0,1	0,8

Source: Ministry of Transport and Infrastructure, Republic of Turkiye

* Other: Includes railway, pipeline, postal transportation, electric power transmission, and self-propelled vehicles.

The cleanliness of water resources is an important indicator to have information about the development and current status of a blue economy in a country. In a country where water resources are at risk of pollution, the blue economy process is expected to be disrupted. There are many indicators regarding the cleanliness of water resources. Indicators such as the proportion of the population that has access to clean water resources, the number of aquatic life forms, fish deaths due to pollution, and mortality rates due to unhealthy water resources can help us determine the extent of water pollution. This study examined the share of the population not using improved water resources in the total population. Improved water resources refer to safe and usable resources. Improved water resources include municipal water, rainwater, and boreholes. Table 4 contains data covering the period from 2000 to 2022. The decrease in the proportion of the population not using improved water resources indicates a positive outlook regarding the country’s water resource supply. Comments can be made that infrastructure investments are developing, public health is improving, and resources are being used more efficiently.

Table 4. *Share of the population not using improved water sources (2000-2022)*

Years	Türkiye	High-income countries	Upper-middle-income countries
2000	4,40	1,78	15,97
2001	4,32	1,75	15,58
2002	4,11	0,99	14,71
2003	3,90	0,97	13,86
2004	3,69	0,95	13,02
2005	3,49	0,96	12,21
2006	3,30	0,94	11,43
2007	3,11	0,91	10,66
2008	2,92	0,87	9,92
2009	2,74	0,85	9,21
2010	2,56	0,82	8,51
2011	2,38	0,79	7,84
2012	2,21	0,77	7,19
2013	2,04	0,74	6,57
2014	1,88	0,72	5,97
2015	1,72	0,59	5,38
2016	1,56	0,58	4,83
2017	1,41	0,56	4,31
2018	1,25	0,55	3,79
2019	1,11	0,54	3,30
2020	0,96	0,54	2,84
2021	0,96	0,53	2,42
2022	0,96	0,52	2,05

Source: Our World in Data

According to the information in Table 4, the proportion of Türkiye's population that does not use improved water resources has decreased over time. This rate was 4.40% in 2000. In the following years, it first fell below 3% and then fell below 2%. In 2020, 2021, and 2022, the proportion of Türkiye's population that did not use improved water resources remained below 1%. Even if there has been an improvement in the use of improved water resources

in Türkiye over time, it is important to determine whether the improvement is sufficient and whether further improvement is needed. For this reason, data from high-income and upper-middle-income countries are also shown in the table to see Türkiye's place among other countries. In high-income countries, the proportion of the population not using improved water resources was less than 1%, except in 2000 and 2001. This proportion has also decreased in high-income countries over time. However, the proportion of Türkiye's population that does not use improved water resources is higher than that in high-income countries. Türkiye should aim to further reduce the proportion of the population not using improved water resources.

The proportion of the population not using improved water resources is higher in upper-middle-income countries, including Türkiye. However, in these countries, the proportion of the population not using improved water resources has decreased over time. In upper-middle-income countries, the lowest proportion of the population not using improved water resources during the 2000-2022 period was in 2022, at 2.04%. This rate is quite high compared with Türkiye and other high-income countries. Access to improved water resources needs to be expanded in upper-middle-income countries, and infrastructure investments need to be developed.

Promoting the Blue Economy

The blue economy is an important element of sustainable development. The main goal of sustainable development is to use resources efficiently and minimize environmental pollution in a way that also considers future generations' interests. Environmental pollution is not limited to air or soil pollution (Ridzuan et al., 2022). Since a large part of the earth is covered with water, protecting water resources and reducing water pollution are also part of the fight against environmental pollution. Therefore, adopting blue economy principles and implementing policies that will develop the blue economy means protecting the future of national economies and the entire world. Policies that will develop the blue economy can facilitate the achievement of economic, social, and environmental goals (Lee, Noh, & Khim, 2020).

The most important policy that can be implemented to develop the blue economy is the protection of marine resources and seacoasts. As an export item, fish and other aquatic creatures play a role in meeting nutritional needs and increasing national income. If seafood production is increased, the country's export volume will increase, the competitiveness in this sector will increase, and new job opportunities can be created in seafood production. To increase seafood production, priority should be given to the cleanliness of the seas, and seafood should be free of toxic substances such as heavy metals. The higher the marine pollution, the lower the seafood production and the lower the quality of the products produced (Ahammed et al., 2025). Measurement

standards and techniques for pollution rates should be determined to reduce marine pollution, and these standards should be shared with the public openly and clearly. In addition to determining measurement standards, monitoring their course over time is important to determine whether the fight against marine pollution is successful. Thus, if marine pollution has not been reduced to the targeted extent, comparisons can be made between the past and present, and policies can be revised (Silver et al., 2015).

The blue economy includes different sectors, such as aquaculture, maritime transportation, shipbuilding, and coastal tourism. The development of these sectors and production based on new technologies will contribute to the development of the blue economy. However, new investments are needed to develop sectors linked to the blue economy. Increasing production capacity, using innovative technologies, and switching to renewable energy sources are costly. High costs may cause private sector representatives to be reluctant to invest in these sectors. To prevent this, private sector incentive practices should be implemented. Cooperation between the public and private sector should be increased. It can help private sector investors through credit facilities, consultancy services, and technical support. New financing instruments can be produced for blue economy sectors. The volume of sectoral loans can be increased. Any policy that increases the financial capacity of producers operating in blue economy sectors will help achieve blue economy goals (Tirumala and Tiwari, 2022). In particular, the tourism sector plays a key role in the blue economy. Coastal areas are suitable for marine tourism. Arrangements should be made to promote sustainable blue tourism in these regions. The number of coastal tourism facilities should be increased. However, care must be taken to ensure that these facilities do not harm the natural beauty of the coasts or the existence of marine life. Facilities should be built to highlight the coast's natural beauty, offer various water sports, and attract tourists. For this purpose, policies specific to the tourism sector can be implemented, government support for the tourism sector can be increased, and tax reductions and exemptions can be provided (Gallegati et al., 2025).

Governance and legal regulations are one of the issues that cannot be ignored in the development of the blue economy. The legal framework for sectors related to the blue economy must be determined accurately and clearly, and compliance with the determined legal framework must be monitored. The legal framework must be inclusive. Issues such as sea and ocean areas, the scope of the fight against pollution, the rights of those engaged in the fishing industry, and legislation on maritime transportation should be placed on a legal basis (Benzaken et al., 2022). The penalties and sanctions to be applied to those who do not comply with the specified laws should be clarified. In addition, it is important to ensure that legal regulations comply with international agreements and are designed in a way that encourages

international cooperation. Regional collaborations are important for the blue economy, as in many other areas. Sanctions and audits regarding compliance with the legal framework are directly linked to the quality of governance. In countries with high governance quality, stakeholders are treated fairly, the rule of law is upheld, and accountability is paramount (Roy, 2019).

To develop the blue economy, trained and specialized personnel are needed. Individuals should be informed about career opportunities in sectors such as tourism, aquaculture, hydro energy, and maritime transportation. Job opportunities in this field should be highlighted through educational programmes and school curriculum adjustments. Education is an important part of the blue economy's long-term plans. Training programmes should be created to train people who are knowledgeable about current developments in fields related to the blue economy, use technological innovations, and have high knowledge and skills (Wordu and Wodi, 2024).

Conclusions and Recommendations

A blue economy is an important element of sustainable growth. In this study, basic information about the blue economy was explained, and with the help of some indicators, the kind of picture Türkiye draws in terms of the blue economy was examined. As a country surrounded by seas on three sides, Türkiye has a high potential for activities related to the blue economy. In this study, major indicators such as aquaculture production, foreign trade data related to aquaculture, the share of maritime transport among other modes of transport, and the proportion of the population not using developed water resources were examined for Türkiye. Total aquaculture production in Türkiye has increased over time. There has also been an increase in aquaculture exports. The share of maritime transport in freight transport is significantly higher than that of other modes of transport. Positive developments have been made over time regarding the cleanliness of water resources and access to clean water. The proportion of the population in Türkiye that does not use improved water resources has decreased over time. However, even if the data examined show a positive trend, this development should continue to increase, considering its potential. At this point, the policies to be implemented regarding the blue economy gain importance. Türkiye must better utilize its potential in water and aquaculture and combine this potential with technology.

Türkiye can implement many policies to accelerate developments in the blue economy. Activities that endanger the cleanliness of the seas and water resources should be prevented. Discharging factory or household waste into the sea should be prevented. Legal regulations regarding this matter should be reviewed and criminal sanctions should be made more deterrent if necessary. However, while criminal sanctions are an important tool in preventing water pollution, raising the awareness level of companies and society is necessary.

The importance of protecting the seas and the contributions of marine resources to the economy and sustainability should be explained to society. The public's attention should be drawn to this issue through educational programmes and visuals and videos on social media.

Even if the total aquaculture production in Türkiye is increasing, the production of aquaculture products with higher added value can be increased. Incentive programmes can be implemented for the production of high-value-added products such as shrimp, crab, mussels, and seaweed. The importance of increasing the diversity of seafood should also be given. Measures should be developed to combat the problem of overfishing more effectively.

Türkiye has a high tourism potential with its long coastline and mild climate. Policies can be developed for sustainable marine tourism. Facilities focusing on water sports, such as diving and sailing, can be established. Practices that will support yacht tourism can be implemented.

Studies can be carried out to increase the use of seafood in chemistry, cosmetics, and pharmaceuticals. Seafood is an important input for such sectors. However, more advanced technologies and R&D activities are needed to effectively use these inputs. In addition, technological development is required to make greater use of water resources in renewable energy production. Financial resources and financing support are needed to perform technological investments and R&D activities. New instruments, such as blue bonds and loans, can be made widespread, especially for companies and individuals operating in areas related to the blue economy.

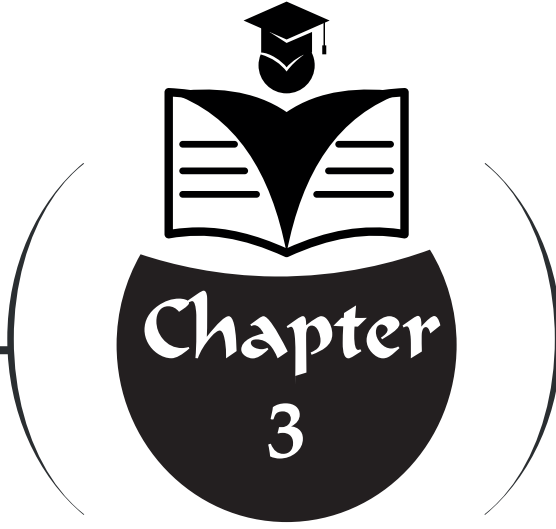
Türkiye can move forward and increase its competitiveness in the blue economy. What needs to be done is to analyze the current situation and develop policies that will produce long-term solutions.

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**COMPATIBILITY PROBLEMS BETWEEN
ECONOMIC PROCESS POLICY
INSTRUMENTS AND FISCAL POLICY
INSTRUMENTS (PUBLIC EXPENDITURE AND
PUBLIC REVENUE POLICY)**

“=====”

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INTRODUCTION

This article examines the compatibility problems between the Economic Process Policy Instruments and Fiscal Policy Instruments. Before addressing the instruments of economic process policy, it is useful to clarify the meaning of the term 'process'. The term “process” denotes a sequence of events or actions that are unified or occur in a repeated, orderly manner, progressing and developing (Eren et al., 1988: 1356).

Economic process policy is also referred to as economic flow policy (Pütz, 1994: 153). The instruments of economic process policy are divided into three categories: Fiscal Policy Instruments, Monetary Policy Instruments and Exchange Rate Policy Instruments. Exchange rate policy may function as a monetary policy instrument when exchange rates are set directly by the state, without market intervention. However, since such a situation has not occurred in Türkiye since the 1980s, exchange rate policy instruments will be examined separately from monetary policy instruments (Erkan, 1990: 182 and 200).

This article will address the relationship between fiscal policy instruments and economic process policy instruments, as well as the compatibility problems that arise within this relationship.

I. FISCAL POLICY INSTRUMENTS

The instruments of fiscal policy are divided into four categories: Expenditure Policy,

Revenue Policy, Debt Policy and Budget Policy (Aren, 1989: 233).

This study will begin by defining two of these instruments—expenditure policy and revenue policy.

A. EXPENDITURE POLICY

Before explaining the government's expenditure policy, it is necessary to define the concept of public expenditure and to clarify its classification.

Public expenditure arises directly from public services, as the provision of each service necessitates spending. Therefore, public expenditure can be defined as the spending related to public goods and services managed through the public budget. These expenditures are carried out to perform public functions (Batirel and Güner, 1994: 25).

There are two types of classification for public expenditures: administrative classification and scientific/economic classification.

Administrative classification groups the expenditures of public institutions according to the administrative structure and aims to provide information on the locations and amounts of these expenditures. This classification helps organize the administrative structure and facilitates coordination and division of tasks. Administrative classification itself is further divided into organic and functional classification.

In organic classification, expenditures are distributed based on administrative units. The purpose is to allocate total expenditure in accordance with the duties assigned to each administrative unit. Allocating total expenditures among units such as the Grand National Assembly of Türkiye (T.B.M.M.), the Presidency, the Court of Accounts, the Constitutional Court, the Ministry of Interior, the Ministry of Treasury and Finance, the Ministry of Health, and others forms the foundation of this classification.

This classification is also referred to as legal classification, since administrative units are established in line with the country's legal system. Unlike the scientific classification of expenditures, which is discretionary and can be adjusted according to the intended objectives, the legal classification must comply with predetermined legal principles. When these principles change, the legal classification can be adjusted accordingly.

In functional classification, public expenditures are organized based on the type of service rendered. This form of classification has been in use for approximately the past sixty-five years. The transition to functional classification was justified by the fact that organic classification lacked rationality and homogeneity. Functional classification enables the

identification of the nature of services provided by administrative units. In contrast, organic classification only reveals the expenditures made by administrative units. As is well known, the state fulfills its functions through administrative units. However, it may occasionally assist in carrying out a specific function.

Public expenditures, from a scientific and economic standpoint, are categorized into four groups.

One of these classifications divides public expenditures into real expenditures and transfer expenditures. This form of classification is frequently used, particularly in budgetary practices. Real expenditures are the government's consumption expenditures. Through such expenditures, the government acquires production factors either directly or indirectly. For example, when the government pays a salary to a civil servant it employs, it obtains the right to benefit from that person's services for a certain period. The government may rent or purchase buildings for use in public services and make payments to the rightful owners in return. Whether the government procures goods and services from the market to carry out specific services or purchases already produced goods and services to fulfill its duties, all such expenditures are considered real, or in other words, actual expenditures.

Transfer expenditures refer to public spending made without any corresponding provision of goods or services. Through such expenditures, the government does not acquire production factors. Instead, funds from the government's own assets are transferred to the assets of other individuals or institutions. Subcategories of transfer expenditures include financial assistance provided by the central administration to other public entities, interest payments on domestic and foreign public debt, social transfers, and payments made as part of economic or fiscal policy purposes.

Another form of scientific and economic classification of public expenditures is based on the benefits they provide. According to this classification, expenditures can be categorized as those that benefit the entire society; those that primarily benefit a specific group but ultimately serve the public interest;

those that are intended to benefit the whole society but in practice provide greater benefit to certain individuals; and finally, those that provide benefits exclusively to individuals.

Another classification of public expenditures is based on their economic efficiency, distinguishing between productive and unproductive spending. According to this approach, expenditures that enhance a country's economic potential are considered productive, while those that lead to unnecessary consumption of national resources are deemed unproductive. From this perspective, expenditures on scientific research, public investments, and economic subsidies that increase production, and thereby national income in the short or long term, are classified as productive. In contrast, expenditures such as defense spending, general administrative costs, and similar items are regarded as unproductive.

The final scientific and economic classification of public expenditures distinguishes between current and investment expenditures. In this context, current expenditures refer to consumption-related spending, while investment expenditures are those directed toward the acquisition and formation of capital goods (Eker & Tüğen, 1990: 83–95).

Expenditure policy, as a fiscal policy instrument, is applicable only when the objective is to maintain economic stability. A prime example is the use of public expenditure policy in combating inflation and recession.

When public expenditure policy is examined in the context of combating inflation, The intended outcome of using public spending as an instrument against inflation is to achieve economic stability through public expenditures. This function ascribed to public expenditures has been on the agenda for the past 90–100 years. Classical economists favored small-scale, real, and economically neutral public expenditures, did not consider public spending as an instrument for fighting inflation. In fact, classical economists generally rejected the use of economic policy instruments to combat inflation or deflation, as they did not view economic instability as warranting intervention,

and therefore they did not assign functional roles to fiscal policy instruments (Türk, 1985: 74).

In the short term, the primary objective of combating inflation is to absorb excess demand exceeding supply in the economy. To achieve this, public revenues are kept at their current level, while public expenditures are reduced. This is because public spending itself constitutes demand or generates demand. Consequently, a budget surplus and a net reduction in total spending are expected. The reduction in total expenditures leads to a greater contractionary effect on the economy, depending on the public expenditure multiplier. Cutting public investment expenditures in the short term can help reduce inflationary pressures by curbing aggregate demand. However, although this method may not provoke strong public reaction in the short term, it will have a constraining effect on the economy's production capacity in the long term, thereby limiting economic growth and the future availability of goods and services. Another category of expenditure subject to cuts in the context of inflation control is current expenditures, which include personnel, education, and healthcare spending. Cuts in these areas would not only trigger strong public reactions but also conflict with the principle of equity. In an inflationary environment, cutting transfer expenditures is also virtually impossible. These expenditures consist of social assistance to retirees, widows, and orphans, as well as interest payments on domestic and foreign debt. Reducing social transfers would not only violate equity principles but also provoke significant public opposition. Similarly, making off-program expenditure cuts in interest payments on domestic and foreign debt would lead to severe economic and political consequences.

The objective of public expenditure policy in combating recession is to address deficiencies in aggregate demand. To this end, tax revenues are maintained at their current levels while public expenditures are increased. This leads to a budget deficit and a net increase in total demand. In combatting recession, public expenditure policy serves to compensate for shortcomings in private spending, enabling the economy to reach equilibrium at full employment. In this way, the decline in national income is prevented,

reductions in private sector spending are avoided, and contractionary forces in the economy are mitigated, allowing the economy to re-enter a process of expansion.

The impact of public expenditures on aggregate demand differs depending on whether the spending is directed toward goods and services or transfer payments.

In an economy experiencing a severe recession, where rapid stabilization is desired, the most effective solution is to increase public spending on goods and services. This is because such type of expenditure directly influences aggregate demand and has a stronger and more expansionary effect compared to transfer payments.

Since transfer expenditures affect demand indirectly, their expansionary impact on the economy is weaker than that of public spending directed toward the purchase of goods and services. However, an important exception must be considered: if the recipients of transfer payments have a marginal propensity to consume equal to one (e.g., individuals in low-income groups), the entire amount received will be spent (e.g., individuals in low-income groups), the entire amount received will be spent. In such cases, the economic impact of transfer expenditures may be comparable to that of current and investment expenditures. If transfer expenditures are directed toward individuals with a high marginal propensity to consume, they serve as an effective tool not only for combating recession but also for promoting income equality.

Regarding transfer expenditures made to firms, it can be argued that the effectiveness of such expenditures in addressing recession in an economy is relatively weak. This is because, during such periods, the main constraint preventing these entities from investing is not the lack of funds available for investment, but insufficient demand. However, if the transfer expenditure is aimed at resolving a bottleneck in the production of a key good that contributes to the recession, its impact on the economy can be positive (Ataç, 1994: 120–122, 142–144).

The effectiveness of expenditure policy is, to some extent, dependent on the proportion of public spending within the total national expenditures. The higher this proportion, the greater the potential for public expenditure policy to influence the economy.

Table 1

Years	Public Expenditure Growth Rates	Inflation Rates
1980	81.2	115.6
1981	42.3	36.8
1982	8.1	25.2
1983	65.2	31.4
1984	46.8	52.0
1985	51.8	45.0
1986	27.9	34.6
1987	53.9	39.0
1988	67.6	73.7
1989	81.3	63.9
1990	75.8	60.3
1991	93.7	63.8
1992	70.2	72.3
1993	117.6	66.1
1994	84.0	120.6
1995	91.1	93.6
1996	129.7	80.4
1997	6.1	99.1
1998	20.7	69.7
1999	32.0	68.8
2000	17.5	39.0
2001	-28.8	68.5
2002	22.8	29.7
2003	27.0	18.4
2004	15.9	9.3

2005	6.1	7.7
2006	12.2	9.7
2007	26.4	8.4
2008	-13.3	10.1
2009	15.9	6.5
2010	6.6	6.4
2011	-8.9	10.5
2012	18.4	6.2
2013	-3.6	7.4
2014	3.3	8.2
2015	-12.6	8,8
2016	13.5	8.5
2017	-10.4	11.9
2018	-14.5	20.3
2019	4.4	11.8
2020	-6.2	14.6
2021	-35.7	36.1
2022	43.5	64.3
2023	54.3	64.8

Source: The table has been prepared using data from the Ministry of Treasury and Finance, Ziraat Bank, the Presidency, and TURKSTAT.

In this section, the relationship between inflation rates and public expenditure growth rates will be examined using econometric analysis.

B. REVENUE POLICY

Before explaining the government's revenue policy, it is necessary to define

the concept of public revenue and to identify its types.

The state requires revenue to fulfill the duties it has undertaken. While individuals may contribute to public activities through physical labor or in-kind contributions, such as for local services or military service, these are

limited today. Beyond these examples, the state's ability to produce goods and services and to secure the necessary factors depends on its access to specific revenue sources (Nemli, 1990: 108-148).

Public revenues obtained by the state are examined under two categories: those derived from the state's sovereign authority, and those obtained independently of such authority.

Revenues derived from the state's sovereign authority include taxes, fees, charges, honoraria, parafiscal revenues, fiscal monopolies, compulsory loans, emission and monetary-credit policies, inflation tax, monetary and tax penalties, funds, and fund revenues.

Revenues obtained independently of sovereign authority consist of property and enterprise income, non-compulsory loans, and intergovernmental aid (Devrim, 1996: 161–172).

As an instrument of fiscal policy, revenue policy becomes relevant only when the primary objective is to ensure economic stability. Examples include the use of public revenue policy to combat inflation, recession, and stagflation. This section will first address public revenue policy in combating inflation, followed by an examination of tax policy in this context. When analyzing tax revenues, income taxes, expenditure taxes, and wealth taxes will be addressed. The same approach will be followed when examining public revenue policy in combating recession and stagflation.

In an inflationary economy, one method to reduce aggregate demand, which exceeds aggregate supply, is to maintain public expenditures at their current level while increasing public revenues. In an inflationary economy, public revenues tend to increase naturally compared to the previous period, owing to their income elasticity. However, this increase is often insufficient to address economic instability, making it necessary to implement deliberate changes in public revenues beyond this natural growth (Ataç, 1994: 123). In the short term, the contractionary fiscal policy in question may help keep the price level under control in the fight against inflation. One method to slow the growth rate of aggregate demand in combating inflation is to increase taxes. As

the money supply continues to grow, one method of offsetting the resulting inflationary impact is for economic policymakers to increase taxes. Taxes should be increased on a permanent basis; in other words, such increases should not be temporary or limited to specific periods (Edgmond et al., 1996: 339–340).

In an inflationary economy, income tax serves both as an anti-inflationary measure and as one of the most effective tools for influencing income and consumption under inflationary conditions. Moreover, the progressive structure inherent in income taxation contributes to a more equitable distribution of income. The significance of this progressive structure lies in its ability to automatically adjust tax revenues in response to changes in national income. However, if the State deliberately increases tax rates as an anti-inflationary measure, it may discourage savings and investment among individuals with high saving capacities. If the resulting decline in private savings cannot be offset by increased public savings, it is evident that this will negatively affect capital accumulation in the long run. On the other hand, increasing tax rates for low-income groups, who have a high propensity to consume, would significantly reduce aggregate demand. Yet pursuing such a path in an inflationary environment would further exacerbate income inequality and lead to much deeper and more serious social issues.

In an inflationary economy, expenditure taxes play a more effective role in reducing aggregate demand, as they directly target consumption. However, these taxes tend to create a negative perception among consumers. This stems from the fact that consumers often interpret increases in expenditure taxes as price hikes and subsequently demand wage increases. Such misperceptions ultimately lead to a wage–price spiral.

In an inflationary economy, wealth taxes can be used in the short term to curb aggregate demand. However, they are not effective instruments for achieving this objective in the long run, as wealth taxes are relatively insensitive to changes in the economic cycle (Eker et al., 1994: 155–156).

In an economy experiencing recession, public revenue policy assumes particular importance. In cases of deep and prolonged recessions, such as those in the 1920s, 1930s, 1980s, and early 1990s, Keynesians argue that fiscal policy offers a simple and direct means of addressing the problem. Policies aimed at boosting aggregate demand through tax reductions are likely to gain popularity among voters. Tax reductions have both advantages and disadvantages. Tax reductions and monthly payment increases (e.g., pensions, child benefits, social security) can provide rapid and widespread support to the economy. Once announced and implemented through the budget, such measures involve only minor time lags between tax and transfer adjustments. Tax cuts that reduce the marginal tax rate also provide advantages such as increased net wages or post-tax profits, thereby enhancing incentives. In turn, this can stimulate production, investment, and growth. Estimating the exact amount of spending resulting from tax reductions or wage increases can be challenging; however, in the context of a persistent and deep recession, the precise magnitude of the effect is secondary to its role in stimulating the economy. A significant rise in imports may occur. If the propensity to import is high, the multiplier effect will be weaker, and a deterioration in the current account of the balance of payments may follow (Sloman, 1995: 793).

The most effective tax types for combating recession are income taxes and expenditure taxes. By contrast, wealth taxes are not considered effective instruments in this context.

It can be readily asserted that a reduction in expenditure taxes has a greater impact on increasing aggregate demand in an economy compared to an equivalent reduction in income tax rates. This is because a reduction in income tax rates affects consumption expenditures only to the extent of the portion of income allocated to consumption. In contrast, a reduction in expenditure taxes leads to a decrease in the prices of consumer goods, thereby encouraging individuals to shift their saving–consumption decisions in favor of consumption. Nevertheless, it should be noted that a reduction in income tax rates for low-income groups with high marginal propensities to consume, or an increase in standard deductions, would increase consumption expenditures

and thus serve as an effective measure in combating recession. In an economy facing the problem of recession, it is evident that reducing expenditure taxes levied on widely consumed essential goods can lead to a significant expansion in aggregate demand. Moreover, such measures are likely to align with the objective of improving income distribution.

During periods of economic recession, in addition to increasing consumption expenditures, a reduction in income tax rates for high-income groups with a high propensity to save may be considered in order to stimulate investment expenditures. However, as is well known, the issue during these periods is not a lack of savings but a lack of demand. Therefore, savings increased through this method may not be directed toward investments by entrepreneurs due to insufficient demand in the economy. Moreover, in such cases, increasing individuals' disposable income through tax reductions may not only fail to achieve the desired economic recovery but could also intensify the severity of the recession (Ataç, 1994: 145).

Another economic problem in which public revenue policy becomes relevant is stagflation. However, in combating stagflation, public revenue policy is contractionary and is examined solely within the scope of tax policy. To combat stagflation, fiscal policy should be supply-oriented. In this context, any tax reform should encourage work and investment, reduce the monopoly power of trade unions, raise minimum wages, and lower the level of unemployment benefits (Sloman, 1995: 815–816). Only standard rational expectations economists consider monetary and fiscal policies ineffective and refrain from proposing any definitive policy prescriptions. Nevertheless, the 1979 tax bill in the United States promoted increased business investment through more favorable tax treatment of capital gains and stronger investment allowances, with the aim of stimulating investment and job creation (Mabry and Ulbrich, 1989: 464).

In combating stagflation, fiscal policy implemented through tax reductions is expansionary in nature. This expansionary fiscal policy serves to increase employment by exerting a moderating influence on collective wage

bargaining. Moreover, in order to ensure that expansionary fiscal policy is taken into account in wage policy decisions, such measures may be tied to a specific wage policy—as was the case in the United Kingdom. In this way, cost-push inflation resulting from wages can be addressed. Another proposed approach to addressing wage-related cost inflation, particularly discussed in the United States, is the Tax-Based Income Policy. Under this approach, wage agreements deemed “excessively high” from the standpoint of price stability would be treated as external costs and penalized through taxation. Conversely, wage agreements remaining below certain limits would be considered external benefits and rewarded financially. As this proposal suggests, the tax policy in question is primarily aimed at promoting employment. Based on this, it can be argued that fiscal policy instruments should be employed to encourage private investment, enhance the willingness to work, and accelerate technological progress, particularly in the form of new technologies and products. The rationale behind this approach lies in 'supply-side economics', which emerged as a reaction to the demand-oriented analysis that dominated economic theory for many years. Supply-side economists argue that the impact of taxation on aggregate demand has been greatly exaggerated, and that tax increases aimed at regulating incomes and prices have overlooked their adverse effects on savings, labor supply, and risk-taking behavior. These economists claimed that tax reductions would stimulate economic growth by positively influencing labor supply and capital accumulation. One of the leading proponents of this view, Arthur B. Laffer, argued—based on the relationship he established between tax rates and tax revenues—that lowering tax rates could increase rather than decrease tax revenue (Turhan, 1987: 359–363).

The effectiveness of revenue policy is, to some extent, dependent on the proportion of public revenues within total national income. The higher this proportion, the greater the potential for public revenue policy to influence the economy.

Table 2

Years	Public Revenue Growth Rates
1980	72.4
1981	55.5
1982	5.6
1983	66.2
1984	39.8
1985	58.6
1986	19.6
1987	46.0
1988	68.4
1989	78.4
1990	80.3
1991	75.1
1992	79.7
1993	100.6
1994	110.3
1995	87.5
1996	93.6
1997	53.1
1998	50.1
1999	37.6
2000	43.4
2001	35.1
2002	31.8
2003	24.6
2004	9.5
2005	19.8
2006	20.5
2007	8.9
2008	9.2

2009	39.5%
2010	15.7
2011	14.5
2012	12.2
2013	12.8
2014	9.6
2015	13.8
2016	12.9
2017	12.1
2018	16.8
2019	13.4
2020	14.9
2021	26.7
2022	49
2023	46.2

Source: The table has been prepared using data from the Ministry of Treasury and Finance, Ziraat Bank, the Presidency, and TURKSTAT.

C. ECONOMETRIC ANALYSIS

An econometric analysis of the policies discussed above is presented below.

1. Methodology

This study aims to estimate the research models presented in Equations 1 and 2 to examine the effects of inflation on budget expenditures and budget revenues.

$$\text{LNGEXP}_t = \alpha + \beta \text{CINF}_t + \varepsilon_t$$

(1)

$$\text{LNGREV}_t = \rho + \gamma \text{CINF}_t + \mu_t$$

(2)

In the equations, the subscript t denotes the time dimension, covering 45 annual observations from 1980 to 2024. The terms α and ρ represent the constant parameters, while ε and μ denote the error terms. The coefficients β

and γ refer to the estimated impact coefficients of inflation on public expenditures and public revenues, respectively. The variables are defined as follows: LNGEXP: The logarithm of annual public expenditures adjusted to real terms using the Gross Domestic Product deflator, LNGREV: The logarithm of annual public revenues adjusted to real terms using the Gross Domestic Product deflator, CINF: Annual consumer inflation

To examine the unit root processes of the variables, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were applied (Dickey & Fuller, 1981) (Phillips & P.Perron, 1988) In addition, to account for structural breaks, ADF unit root tests with structural breaks were also employed. Since the variables were found to be non-stationary at levels but became stationary at their first differences, the Johansen Cointegration Test was employed to examine the cointegration relationships among the variables. Johansen cointegration test is a method used to identify cointegration vectors in multivariate systems (Johansen, 1991). Based on the results of the Johansen cointegration test, indicating that the variables are cointegrated, the Fully Modified Ordinary Least Squares (FMOLS) estimator was employed to estimate long term coefficients. FMDOLS method was employed. The FMOLS method is designed to correct for autocorrelation and endogeneity issues in cointegrated series (Phillips & Hansen, 1990). To investigate short term causality relationships among the variables, Granger causality analysis was applied. The Granger causality test examines whether one variable is influenced by the past values of another variable (Granger, 1969).

2. Findings

This section presents the findings obtained from the data analysis. The descriptive statistics for the variables included in the study are provided in Table 3.

Table 3: Descriptive Statistics of Variables

Statistics	GEXP	GREV	CINF
Mean	2590000000000	2270000000000	31.584
Maximum	18400000000000	14800000000000	71.889
Minimum	792744	723662	6.063
Standard Deviation	3730000000000	3170000000000	20.944
Skewness (S)	-0.489	-0.462	0.201
Kurtosis (K)	1.649	1.622	1.615
Jarque-Bera	$\chi^2_{(2)}=5.211^*$	$\chi^2_{(2)}=5.165^*$	$\chi^2_{(2)}=3.900$
	[0.074]	[0.076]	[0.142]
Number of Observations	45	45	45

***, **, and * denote statistical significance at the 1%, 5%, and 10% levels,

respectively. $\chi^2_{(S.D)}$ S.D refers to the degrees of freedom in the Chi-square test statistic, while values in square and values in [brackets] show the corresponding p-values.

The GEXP variable ranges from 792,744 to 18,400,000,000,000, with a mean of 2,590,000,000,000 and a standard deviation of 3,730,000,000,000.

It is normally distributed at the 5% significance level ($\chi^2_{(2)}=5.211$, $p>0.05$).

The GREV variable ranges from 723,662 to 14,800,000,000,000, with a mean of 2,270,000,000,000 and a standard deviation of 3,170,000,000,000.

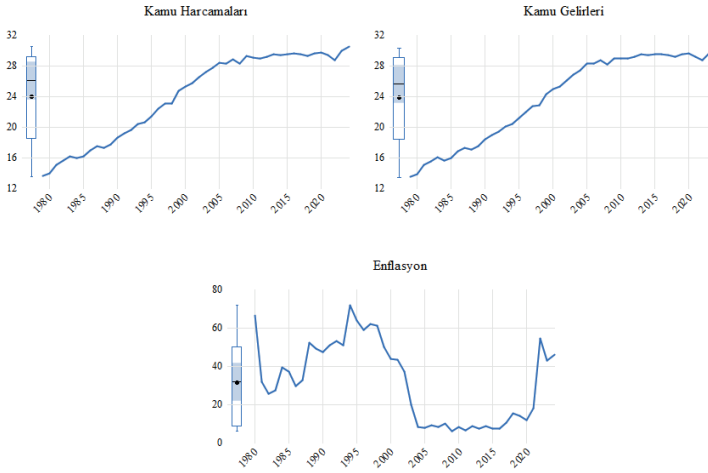
It is also normally distributed at the 5% significance level ($\chi^2_{(2)}=5.165$, $p>0.05$).

The CINF variable ranges from 6.063 to 71.889, with a mean of 31.584 and a standard deviation of 20.944. It is normally distributed at the 10%

significance level ($\chi^2_{(2)} = 3.900, p > 0.01$).

The variable graphs are presented in Figure 1.

Figure 1: Time Series Graphs of the Variables



An examination of Figure 1 reveals that the public revenue and public expenditure variables exhibit a similar upward trend over time. In contrast, the inflation variable displays a more volatile pattern, with both upward and downward trends observed across different periods. Structural break characteristics are evident in both the mean and trend components of the inflation variable. Accordingly, it is considered beneficial to apply unit root tests with structural breaks alongside conventional unit root tests when examining the unit root processes of the variables. The results of the ADF and PP unit root tests are presented in Table 4.

Table 4: ADF and PP Unit Root Test Results

Variable	ADF		PP		Decision
	Constant	Constant+Trend	Constant	Constant+Trend	
GEXP	-2.348	-0.425	-2.377	-0.398	I(1)
	[0.162]	[0.984]	[0.154]	[0.985]	
ΔGEXP	-5.970** *	-6.686** *	-6.022** *	-6.687** *	
	[0.000]	[0.000]	[0.000]	[0.000]	
GREV	-2.354	-0.284	-2.303	-0.291	I(1)
	[0.160]	[0.989]	[0.176]	[0.989]	
ΔGREV	-5.654** *	-6.333** *	-5.677** *	-6.333** *	
	[0.000]	[0.000]	[0.000]	[0.000]	
CINF	-2.045	-1.563	-2.128	-1.709	I(1)
	[0.267]	[0.791]	[0.235]	[0.730]	
ΔCINF	-7.185** *	-7.072** *	-7.228** *	-7.104** *	
	[0.000]	[0.000]	[0.000]	[0.000]	

***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Δ: indicates the first difference of the variable, values in [square brackets] represent the p-values of the test statistics. Lag lengths were selected based on the Akaike Information Criterion (AIC).

An examination of Table 3 indicates that, based on both the ADF and PP unit root tests, none of the three variables included in the research models are stationary at level under either the constant or constant-plus-trend specifications at the 10% significance level ($p>0.10$). However, all variables become stationary at their first differences at the 1% significance level ($p<0.01$). The results of the unit root tests with structural breaks are presented in Table 4.

Table 5: Unit Root Tests with Structural Breaks

Variable	Unit Root Tests with Structural Breaks				Decision
	Unit Root Test Specifications				
	Constant	Structural Break Specification			
		Constant	Trend	Constant+Trend	
GEXP	-3.552	-2.167	-4.297*	4,030	I(1)
	[0.359]	[0.999]	[0.091]	[0.500]	
ΔGEXP	-7.813***	-7.926***	-7.477***	-7.477***	
	[0.000]	[0.000]	[0.000]	[0.000]	
GREV	-3.626	-2.013	-4.504	-3.693	I(1)
	[0.318]	[0.999]	0.053	[0.711]	
ΔGREV	-7.532***	-7.281***	-7.007***	-6.940***	
	[0.000]	[0.000]	[0.000]	[0.000]	
CINF	-2.812	-4.503	-2.296	-4.343	I(1)
	[0.782]	[0.129]	[0.962]	[0.314]	
ΔCINF	-8.889***	-8.746***	-7.383***	-8.570***	
	[0.000]	[0.000]	[0.000]	[0.000]	

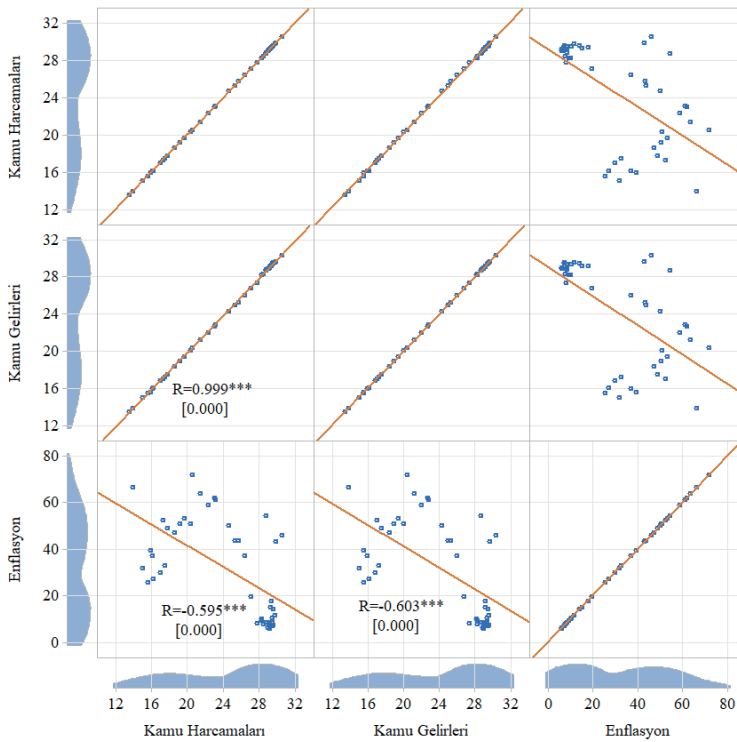
***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Δ : indicates the first difference of the variable, values in [square brackets] represent the p-values of the test statistics. Lag lengths were selected based on the Akaike Information Criterion. Break periods were endogenously determined based on the minimum t-statistics of the Dickey-Fuller test.

An examination of the table reveals that the results of the unit root tests with structural breaks are consistent with those of the ADF and PP tests. In other words, based on the ADF, PP, and structural break unit root tests, all variables included in the study are non-stationary at level but become

stationary at their first differences, indicating that they are integrated of order one ($GEXP \sim I(1)$, $GREV \sim I(1)$, $CINF \sim I(1)$). Given that the variables are non-stationary and integrated at the same order, it is appropriate to examine the cointegration relationships among them prior to estimating the research models.

The correlation and distribution matrix of the variables is presented in Figure 2

Figure 2: Correlation and Distribution Matrix of the Variables



An analysis of Figure 2 shows that there is a statistically significant and nearly perfect positive correlation between public revenues and public expenditures at the 1% significance level ($R=0.999$, $p<0.01$). On the other hand, inflation exhibits statistically significant negative and moderate correlations with both public expenditures and public revenues at the 1% significance level ($R=-0.595$, $R=-0.603$, $p<0.01$).

To identify the long-run equilibrium relationships among the variables, the Johansen cointegration test was conducted. The optimal lag length for the Johansen analysis was determined to be 3 based on information criteria (Appendix 1). For the VAR model with three lags, the system's characteristic roots were found to lie within the unit circle, indicating that the VAR system is stable (Appendix 2). Furthermore, no autocorrelation or heteroskedasticity was detected up to the third lag, and the error terms were found to be normally distributed (Appendices 3–5). Upon confirming these assumptions, the Johansen cointegration test was applied.

Table 6: Johansen Cointegration Test Results

Hypothesis	Eigenvalue	Trace			Max-Eigen		
		Trace Statistics	C.V. (5%)	P	Max-Eigen Statistics	C.V. (5%)	P
None	0.637	74.733***	29.797	[0.000]	41.501***	21.132	[0.000]
At most 1	0.536	33.232***	15.495	[0.000]	31.520***	14.265	[0.000]
At most 1	0.041	1.712	3.841	[0.191]	1.712	3.841	[0.191]

***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Values [in square brackets] represent the p-values of the test statistics. Based on information criteria, the deterministic specification of the model was selected as Model 3 (with constant and linear trend).

An examination of Table 5 indicates that the null hypotheses of no cointegration and at most one cointegration vector are rejected at the 1% significance level ($p < 0.01$). However, the null hypothesis suggesting at most two cointegration vectors cannot be rejected at the 10% significance level ($p > 0.10$). Therefore, it can be concluded that there are two cointegration vectors among the variables. In other words, the variables can be said to exhibit statistically significant comovement in the long term. Based on the

cointegration findings, the Fully Modified Ordinary Least Squares (FMDOLS) estimator was employed to estimate the long term coefficients among the variables. The FMDOLS estimation results are presented in Table 7.

Table 7: Long term FMDOLS Estimates

Variable	Model 1 (Dependent Variable: GEXP)	Model 2 (Dependent Variable: GREV)
CINF	-0.184	-0.187
	0.059	0.059
	-3.119* ** [0.003]	-3.190* ** [0.003]
Constant	30.239	30.152
	2.169	2.159
	13.939* ** [0.000]	13.969* ** [0.000]

***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Values in [square brackets] represent the p-values of the test statistics

An examination of Table 7 reveals that, in Model 1, the long term effect of the CINF variable on GEXP is statistically significant and negative at the 1% significance level ($\beta=-0.184$, $p<0.01$). This indicates that a 1% increase in inflation leads to a 0.184% decrease in real public expenditures in the long term. Similarly, in Model 2, the long term effect of the CINF variable on GREV is statistically significant and negative at the 1% significance level ($\gamma=-0.187$, $p<0.01$). This indicates that a 1% increase in inflation results in a 0.187% decrease in real public revenues in the long term.

To investigate short term causal relationships among the variables, Granger causality analysis was applied. The results of the Granger causality tests are presented in Table 8.

Table 8: Granger Causality Test Results

Causality	Test Statistics	[p]
GREV→GEXP	$\chi^2_{(4)} = 11.665^{**}$	[0.020]
CINF→GEXP	$\chi^2_{(4)} = 20.443^{***}$	[0.000]
GEXP→ GREV	$\chi^2_{(4)} = 20.773^{***}$	[0.000]
CINF→ GREV	$\chi^2_{(4)} = 14.805^{***}$	[0.005]
GEXP→ CINF	$\chi^2_{(4)} = 4.992$	[0.288]
GREV→ CINF	$\chi^2_{(4)} = 4.674$	[0.322]

***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Values in [square brackets] represent the p-values of the test statistics

An examination of Table 8 shows that the null hypotheses stating that GREV and CINF do not Granger-cause GEXP are rejected at the 5% and 1% significance levels, respectively. This indicates that real public revenues and inflation Granger-cause real public expenditures. Similarly, the null hypotheses stating that GEXP and CINF do not Granger-cause GREV are rejected at the 1% significance level. Therefore, real public expenditures and inflation Granger-cause real public revenues. On the other hand, the null hypotheses stating that GEXP and GREV do not Granger-cause CINF cannot be rejected. This suggests that real public expenditures and real public revenues do not Granger-cause inflation.

CONCLUSION

Public revenues, public expenditures, and inflation rates are interrelated variables that influence one another. In particular, during certain periods under review, the use of central bank resources for public financing has led to structural breaks in the analytical framework. Despite the cessation

of borrowing from central bank sources, Türkiye still lacks a robust revenue structure to sustainably finance public expenditures. To address the distortions in public finance, a comprehensive restructuring of public debt is required.

In order to establish a sound framework for public revenue and expenditure policies in Türkiye, the informal economy must be brought under formal registration, and the revenues generated from this process should be allocated to public investment expenditures. To achieve this, the implementation of a wealth declaration system is urgently needed. Additionally, to combat smuggling, Türkiye's borders must be strictly monitored and controlled. In fact, the necessary actions are quite straightforward; however, this simplicity demands strong political will.

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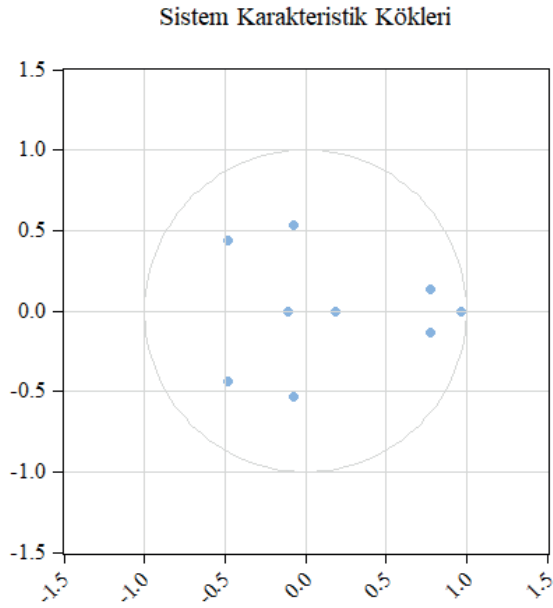
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Appendices

Appendix 1: Information Criteria for Lag Length Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-266.06460	-	73.62598	12.81260	12.93672	12.85810
1	-105.03670	291.38380*	0.05293	5.57318	6.06966*	5.75516*
2	-95.66123	15.62585	0.05240*	5.55530*	6.42413	5.87376
3	-87.79935	11.97999	0.05635	5.60949	6.85069	6.06444

Appendix 2: Characteristic Roots of the VAR Model System



Annex 3: LM Autocorrelation Test

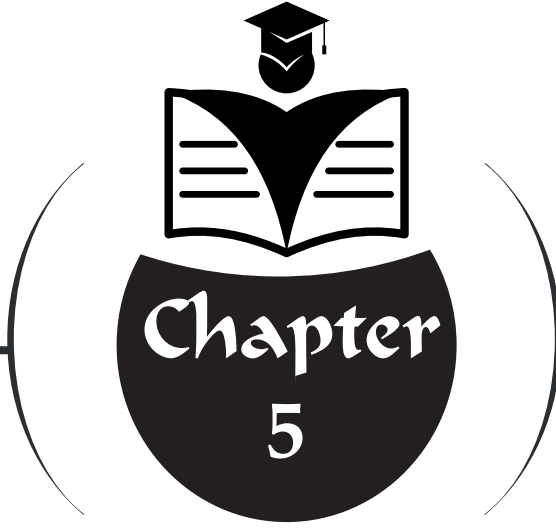
Lag	LRE	[p]	Rao	[p]
1	$\chi^2_{(9)}=14.495$	0.106	$F(9, 56.1)=1.716139$	0.107
2	$\chi^2_{(18)}=19.548$	0.359	$F(18, 57.1)=1.111006$	0.366
3	$\chi^2_{(27)}=35.038$	0.138	$F(27, 50.3)=1.391738$	0.154

Appendix 4: White Heteroskedasticity Test

White Test	[p]
$\chi^2_{(108)}=123.613$	0.145

Appendix 5: Normal Distribution Test

Component	Jarque-Berra	[p]
1	$\chi^2_{(1)}=0.198$	0.657
2	$\chi^2_{(1)}=0.003$	0.953
3	$\chi^2_{(1)}=1.702$	0.192
Joint Test	$\chi^2_{(3)}=1.903$	0.593



GREENLAND IN 2025 GLOBAL DYNAMICS: STRATEGIC LOCATION AND ECONOMIC POTENTIAL

“=====”

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1. INTRODUCTION

Greenland has undergone gradual institutional changes, accelerated by climate change and fisheries' importance. The Second World War ended trade monopolies, boosting fishing and the public sector. Greenland's desire for economic independence influences its political agenda (Arnaut, 2021). In the 'Arctic fire' phase, 'warm' Greenland scenarios are increasingly contrasted with 'cold' ones, as climate change rapidly impacts environmental and human systems. Climate effects are especially evident in Greenland's tourism sector, a key future industry (Ren, 2016; Schrot et al., 2019). Responding will need planned efforts across seasons. Schrot et al. (2019) note that Arctic climate change's trajectory has made local winter tourism providers aware of changing conditions, recognising that adapting in West Greenland requires flexible outdoor activity management and identifying less sensitive alternatives.

In addition to being impacted by climate change, Greenland is also affected by fluctuations in external demand for minerals. Adapting its institutions to environmentally sustainable projects will increase the likelihood of more successful economic and political processes (Arnaut, 2021). Têtua and Lasserre (2017) highlight that global warming is accelerating the melting of sea ice, making Arctic sea routes easier for businesses to access, including Chinese firms. Although China's governmental support and abundant resources have bolstered investments in Greenland's mining sector, Chinese companies also face challenges. In particular, a lack of international management experience and strict regulations pose significant hurdles. These factors must be considered as the political process evolves. Hayashi and Delaney (2024) argue that environmental and climatic changes should be considered as a backdrop to social issues, rather than focusing solely on the environmental aspect. Instead, they suggest analyzing Arctic communities in the context of climate change by considering the complex interaction of environmental, social, and economic factors.

In summary, it has been observed that the temperature increase in the Arctic caused by climate change is faster than the global average and has seriously affected the surrounding areas of Greenland. Greenland's energy system is highly sensitive to oil prices because it is dependent on imported oil. The abundant wind resources, which complement solar energy sources, could enable the transition to a sustainable and self-sufficient energy system (Galimova et al., 2024).

Pantaleo et al. (2022) suggest future energy independence initiatives could protect communities from rising energy prices or supply cuts due to instability. Investing in renewable energy in Greenland's small, remote communities can lower costs and prevent shortages for Nukissiorfiit. The Greenlandic government's renewable energy investments tailored to

community needs are vital long-term strategies. However, sustainable Arctic industrial development requires a reliable supply chain for transit vessels and workers, with many challenges to address, such as weather delays. Technology can help mitigate these issues. Greenland, Canada's east coast, and Baffin Bay see regular vessel traffic, with new ice-strengthened ships becoming important as northern mining grows. Improving regional infrastructure could boost trade, necessitating shifts in investment from southern to northern Greenland (Taarup-Esbensen & Gudmestad, 2022: 94). Climate change is increasingly affecting Arctic coastal regions, especially in northwestern Greenland, impacting livelihoods. Greater collaboration with local communities in research planning and co-management is crucial for predicting and reducing environmental impacts. Studies by Otsuki and Sugiyama (2025) reinforce this need. Engaging communities and incorporating indigenous knowledge are essential for sustainable Arctic development amid environmental changes.

Greenland is transforming due to climate change and fishing, offering opportunities for developing countries. It sits at the crossroads of issues like colonialism, globalisation, climate change, resources, and governance as glaciers melt. This study analyses Greenland literature through bibliometrics, focusing on opportunities for Türkiye and the logistics sector. It aims to guide researchers and policymakers by identifying key themes in the literature.

The research consists of five chapters. The first chapter is an introduction, the second chapter is a review of the literature, the third chapter is a description of the methodology, the fourth chapter is an analysis and discussion and the last chapter is a conclusion.

2.LITERATURE

2.1.The Economic Potential of the Arctic

The Arctic, often seen as a frozen desert, hosts diverse populations and industries. Climate change melts sea ice, opening resources, shipping, and tourism, creating new economic opportunities with significant risks. Stakeholders seek Arctic resources, sparking a 'cold rush,' but high costs and legal, diplomatic, and social challenges slow progress. Political challenges involve balancing local to global perspectives by strengthening institutions and promoting growth. Shared wealth and fair benefits are possible, but future development depends on cooperation among Arctic nations and private actors. Trade is increasing: from 1990 to 2019, Denmark, Finland, Sweden, and Norway led exports, with Russia's recent rise. The Arctic trade network, mainly Europe's route, now includes China, Japan, and South Korea, nearly doubling exports to Asia. Trade is expanding and becoming more complex, with China emerging as a significant partner (Quillérou et.al., 2020; Ma et al., 2024: 13-14).

The Arctic economy, made up of diverse local and national economies, is working to become more independent and gain local control over activities like tourism, manufacturing, and innovation. Rapid climate change, especially glacier melting, is negatively affecting the climate, ecosystems, and communities beyond the Arctic. While research mainly focuses on local economic opportunities, this article introduces an interdisciplinary framework combining climate science, economics, and policy to assess global costs. Although regional industrial activity boosts local economies, it also raises environmental risks. Melting glaciers, carbon emissions, and extreme weather could cause substantial global losses. These feedbacks suggest the economic gains from Arctic warming might be outweighed by global costs (Larsen and Petrov, 2020; Alvarez et.al., 2020).

Within this agenda, the climate conditions of the Arctic region are of great importance. Fu et al. (2021) draw attention to the emerging new conjuncture with the melting of ice in the Arctic region. This change makes the region increasingly attractive for transport and offers various opportunities for the future.

2.2. Greenland

Cook and Jóhannsdóttir (2021) provide research recommendations for Greenland. According to the authors, Greenland’s economy can be studied in detail. In this context, economic support for infrastructure projects and the viability of these projects are among the important research topics for Greenland.

Table 1 presents examples of studies on Greenland, along with the corresponding bibliometric analysis. It can be seen that the reviewed studies mainly focus on environmental issues. This list is the result of searches in the Web of Science (WoS) and Scopus databases. In these databases, no publications were found that have studied Greenland with the scope and methodology addressed in this study.

Table 1. Bibliometric studies on Greenland

Author	Subject	Database
Baztan et al. (2017)	Indigenous life in Greenland	Interview data
Bechshoft et al. (2018)	Ecological and physiological change – polar bears	WoS
Demiroglu & Hall (2020)	Polar tourism	Scopus, WoS
Duc (2021)	An Arctic case study	WoS
Avila et al. (2023)	Environmental chemical pollutants	Scopus
Ipsen et al. (2024)	Health research in Greenland	TheLens
Ricolfi et al. (2024)	PFAS exposure	Scopus, WoS, PubMed

Vendl et al. (2024)	PFAS in wildlife	Scopus, WoS, ...
Taurozzi & Scalici (2024)	Arctic birds	Scopus, WoS
He et al. (2024)	Shallow bathymetry	Scopus

Source: Created by the author

3.METHODOLOGY

3.1.Purpose of the Study

The aim of this study is to examine the general outlook of academic studies on Greenland. Accordingly, the following research question was to be answered:

Research question: What are the trends in social science research on Greenland?

3.2.Research Methodology

The bibliometric analysis method was used in this study. As illustrated in the study by Li et al. (2025), bibliometric analysis studies examine and interpret various parameters such as basic statistics of publications, distribution by years, organisations supporting publications, author information and frequently used keywords. As can be seen from the examples given, bibliometric analysis is a method of evaluating the literature using numerical data.

In the study by Nam (2024) using the bibliometric analysis method, the following analyses were carried out and these examples illustrate the method:

- Descriptive analysis
- Journals with most publications
- Cooperation between countries
- Most cited publications
- Bibliographic matches
- Co-citation at journal level
- Common citations at bibliography level
- Trending words
- Common words

These analyses are important to show how the bibliometric method is applied and how the studies are positioned in the literature.

3.3.Obtaining the Data

On 5 February 2025 a search was performed in the Scopus database using the keyword “Greenland”. The search was based on article title, abstract and keywords and resulted in 30,661 publications. These publications were filtered under the categories “Social Sciences”, “Business, Management and Accounting” and “Economics, Econometrics and Finance”. As a result of the filtering, the number of publications was reduced to 3,084 and the analysis was performed on these publications. The steps in this process are shown in Figure 1.



Figure 1. *Research Design*
Source: *Created by the author*

3.4.Used Software

The R programming language was used for the research. The Bibliometrix library used was developed by Aria and Cuccurullo (2017). As in the study by Chio and Quiles-Cucarella (2024), the Bibliometrix package can be used in bibliometric research.

4.ANALYSIS DATA AND DISCUSSION

4.1.Basic Statistics

Table 2 presents basic statistics and provides explanatory information for researchers interested in the topic. Between 1860 and 2025 a total of 3,084 scientific publications on Greenland were published. These publications can be found in 861 different sources. The average age of the documents was 16.8 years and the annual growth rate was 1.34%. The number of citations per publication was 24.46, with a total of 131,457 citations.

5,286 different keywords were used in the studies, indicating a wide range of research topics. 1,124 publications were single-authored, indicating that the tendency to collaborate in research on the topic is about twice as high as in single-authored studies.

Furthermore, the proportion of studies with international co-authors was 26.56%, which shows the potential for international collaboration in

research on Greenland. The most preferred document types by researchers were articles and book chapters.

Table 2. *Basic statistics*

Description	Results
Timespan	1860:2025
Sources (Journals, Books, etc)	861
Documents	3084
Annual Growth Rate %	1,34
Document Average Age	16,8
Average citations per doc	24,46
References	131457
Keywords Plus (ID)	8765
Author's Keywords (DE)	5286
Authors	6706
Authors of single-authored docs	888
Single-authored docs	1124
Co-Authors per Doc	3,4
International co-authorships %	26,56
article	2415
book	69
book chapter	295
conference paper	87
conference review	6
data paper	7
editorial	13
erratum	8
letter	26
note	32
review	122
short survey	4

Source: Created by the author

4.2.Distribution of Publications by Year

The distribution of all publications by year is shown in Annex 1 and the distribution after 2000 is shown in Figure 2. The data show a general upward trend in research on the topic after 2000.

In particular, 2023 reached the highest level with 167 publications. In 2024 there are 153 publications, indicating that interest in the topic is still high. These results show that academic studies on Greenland continue to actively maintain their place on the agenda.

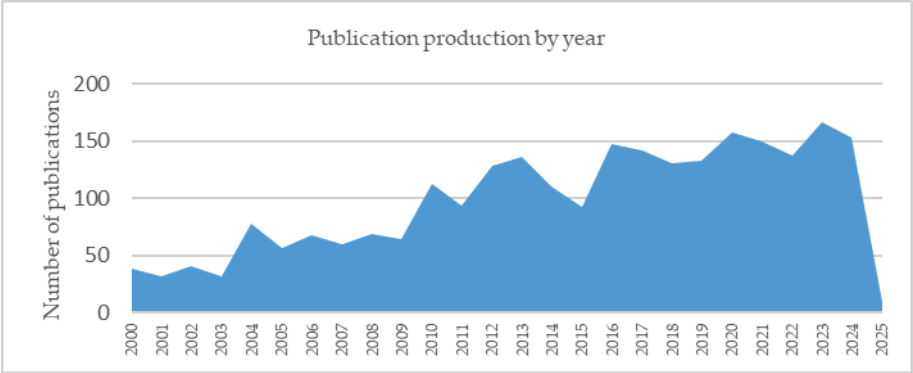


Figure 2. *Distribution of Publications by Year**
Source: Scopus, 2025

*2025 data cover the period between 1 January 2025 and 5 February 2025

4.3. Most Cited Research

Moiwo and Tao (2013) examine the global leadership race between the US and China from the perspective of citation analysis. Similarly, academic publications can be seen as an indicator of a country’s level of development. The same scenario applies to authors.

Table 3 analyses the most cited studies, as the number of citations is an important indicator of publication quality. The top three studies received 1564, 1294 and 855 citations respectively. These results show the interest of other researchers in research on this topic. It is also noteworthy that the main topic of the most cited studies is climate.

Table 3. *Most cited studies*

SN	Author	Subject	Total citation (TC)	TC yearly	Normalize TC
1	(Rasmussen et al., 2014)	Climate	1564	130,33	31,34
2	(Gasse, 2000)	Climate	1294	49,77	13,99
3	(Fleitmann et al., 2007)	Climate	835	43,95	11,74
4	(Alley, 2000)	Climate	734	28,23	7,94
5	(Rahmstorf et al., 2015)	Climate	710	64,55	20,04

6	(Andersen et al., 2006)	Climate	610	30,50	9,27
7	(Lowe et al., 2008)	Climate	584	32,44	12,72
8	(Lenton, 2011)	Climate	571	38,07	15,45
9	(Willis & van Andel, 2004)	Climate	528	24,00	16,45
10	(Stroeve et al., 2016)	Climate	506	50,60	19,08

Source: Scopus (2025)

4.4.Sources with the most Publications

Table 4 lists the sources (journals, etc.) with the highest number of publications. These sources are able to meet the publication needs of academics conducting research on Greenland. It is particularly noteworthy that the first three journals in the list deal intensively with research on the subject.

Table 4. *Sources with most publications*

SN	Journal name	Number of publications
1	Quaternary Science Reviews	617
2	International Journal of Circumpolar Health	308
3	Polar Record	233
4	Geografisk Tidsskrift	52
5	Ambio	45
6	Arctic Anthropology	39
7	Nature Climate Change	38
8	Polar Geography	37
9	Geografisk Tidsskrift-Danish Journal of Geography	30
10	Acta Borealia	28

Source: Scopus (2025)

4.5.Organisations with the most Publications

In Table 5, the list of institutions with the highest number of publications is dominated by European universities, with US universities also in the top 10. Today, the fact that the US and some European countries are at odds over the management of Greenland (Sandeman, 2025) makes this situation even more interesting. Especially in the context of the new conjuncture that will emerge with the melting of underground resources and glaciers, the interest of developing countries in this issue may be a strategic move in terms of their economic interests. Some countries may support this move scientifically.

Table 5. *Organizations with the most publications*

Affiliation	Country	Articles
University Of Copenhagen	Denmark	521
Aarhus University	Denmark	247
University Of Southern Denmark	Denmark	147
University Of Greenland	Greenland	121
University Of Bern	Switzerland	87
Durham University	United Kingdom	83
Stockholm University	Sweden	75
University Of Colorado	USA	70
Aalborg University	Denmark	69
University Of California	USA	65

Source: Scopus (2025)

4.6.Trends

Figure 3 shows the trending themes and their numerical values are given in Appendix 2. The identification of these themes was based on the publications between 1960 and 2025 and the keywords used by the authors. The analysis used the criteria of at least 5 occurrences of a word and at least 3 occurrences per year.

New concepts that have come to the fore in recent years and are significant in their own right include Covid-19, Arctic tourism, the Faroe Islands and Nordic Greenland. As the literature on Greenland continues to develop, as shown in Figure 3, these new concepts may provide an important research opportunity for researchers interested in Greenland.

In recent years, climate and environmental issues have been among the most prominent trends in research on Greenland. In economic terms, the word “mining” has been one of the key concepts to come to the fore.

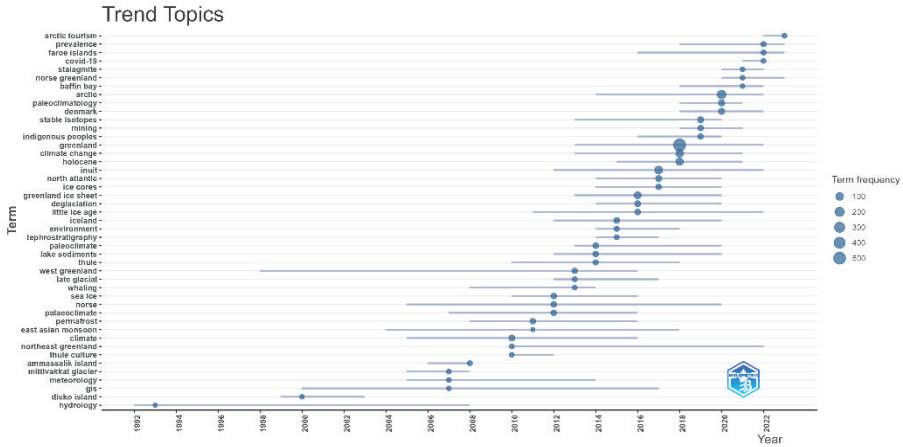


Figure 3. Trending Topics

Source: Prepared by the author using Bibliometrix

Climate-focused studies play an important role in research on Greenland. For example, Berman (2021) examines how climate change is affecting the lives of communities in the Arctic region. In a second example, Sumaila et al. (2014) examine the impact of climate change on the economy and fisheries. While climate-related terms are common in the trending topics, there is also research that is not directly related to climate. Based on the trending topics, this section examines research that can be related to Greenland's economy and international trade potential, in particular mining:

- Mining

- o Liu et al. (2023) state that carbonatite is the main agenda item in relation to rare earth elements in Greenland. The region still appears to have significant potential for mining exploration and exploitation. According to the authors, although Asia is the largest producer, Greenland, Africa and Europe also have significant potential. However, Greenland in particular needs to overcome environmental problems and implement mining processes that are suitable for the region's climatic conditions. The study concludes by emphasising that more than one supply chain will emerge outside China.

- o Banks et al. (2020) studied the mining potential of Greenland. The study emphasises that mineral exploration processes should be organised regionally in the country. It also stresses the importance of miners being able to easily transport the resources they produce to importing countries.

- o Goodenough et al. (2016) draw attention to the European Union's need for rare earth elements. In this context, the authors examine the mineral

deposits in Greenland and highlight the importance of this region for these minerals.

- Supply chain

- o Taarup-Esbensen and Gudmestad (2022) studied the reliability of the Arctic supply chain in Baffin Bay and Greenland. Two key parameters stand out to increase security and ensure integrity in the Arctic supply chain process: effective management and technology. Only through the effective use of these elements can the integrity of the system be maintained and solutions to inter-unit disruptions be found. In this context, innovations such as improved ports, icebreaking vessels and satellite-linked technologies are crucial. In addition, the strengthening of emergency response coordination, the creation of protective barriers and the effective use of icebreaking vessels are important factors in enhancing security.

- o Machacek & Kalvig (2016) conducted a study on rare earth elements for the European Union. The authors point out the complexity of the supply chains of rare earth elements. This complexity requires that the product codes in the databases correspond to the statistical structure.

- Sustainability

- o Ziegler et al. (2021) look at sustainability in the food supply chain. The study compares Greenlandic meat with imported meat in terms of carbon emissions. In particular, greenhouse gas emissions in the production and logistics processes of imported meat are discussed in relation to their environmental impact.

- o Long & Jones (2021) state that Greenland's economy is dependent on offshore fishing. Therefore, sustainable fishing is of great importance to the country's economy. In order to ensure this sustainability, it is emphasised that certification practices in the fisheries sector are mandatory.

- Fishing

- o Jensen et al. (2024) studied four different models for optimising fishing activities on the west coast of Greenland. The researchers consider fishing to be a critical sector for Greenland. This is due to the country's desire to gain independence from Denmark and the need to increase its economic revenues in order to achieve this goal. In this context, fishing is one of the most important sectors.

- o As Kruse et al. (2008) explain, life in the Arctic is difficult, but economic activities such as fishing are among the factors that keep indigenous people in the region.

- o

- Tourism

- o Ren & Fusté-Forné (2024) examine the relationship between food, tourism and national identity in Greenland during independence idea from Denmark.

- o Chen et al. (2024) examine the relationship between climate change and tourism in Greenland and the Arctic in general.

- Transportation

- o West Greenland produces and exports cryolite, as described by Lloyd (1952). The region is also important for fishing. The limited trade with Europe in the past has increased over time, making transport even more important. Today, the need for larger ships and modern ports has increased. The region imports mainly fuel, salt and coal and exports mainly cryolite.

- o As in the example studies above, many topics such as transport, tourism and fisheries can be linked to climate change. This may be an indication of why climate change is prominent in research on Greenland, both among the trending topics in Figure 3 and among the most cited studies listed in Table 3.

4.7.Countries with the most Publications

Table 6 shows the countries with the highest number of publications on Greenland, and the list includes countries with at least two publications. It is noticeable that the top positions are generally occupied by countries that stand out for their economic development.

Denmark comes first, and its colonial role in the region is highlighted by some researchers, such as Dyrendom Graugaard et al. (2025). The author examines Danish practices in the region under the guise of family planning. The analysis points out that this practice is put on the agenda in the context of “genocide”. Poppel (2024) also highlights similar themes. Jerris (2024) discusses how Denmark was able to keep Greenland as a colony. In this climate, Greenland’s desire to separate from Denmark and become an independent state becomes increasingly clear (Ackrén, 2024: 105).

The United States comes second. LaFortune and Landriault (2024) analyse the background to US President Donald Trump’s rhetoric on the takeover of Greenland from the perspective of the Russian media. More recently, Maseland and Spruk (2023) discuss the economic and administrative benefits of Greenland becoming a state of the United States. A similar study was carried out by Eidemiller et al. (2021). These examples show that the political plan announced today by the US President has an academic basis.

Table 6. *Countries with most publications*

Country	Freq	Country	Freq
Denmark	2133	Israel	14
USA	1608	Mexico	12
UK	1061	Croatia	11
Germany	600	S. Africa	11
Canada	581	Chile	10
France	471	Iran	8
Norway	408	Latvia	8
China	382	Romania	7
Sweden	252	Turkiye	7
Spain	241	Morocco	6
Switzerland	190	Serbia	5
Italy	154	Argentina	4
Australia	148	Estonia	4
Netherlands	138	Lithuania	4
Iceland	108	Tunisia	4
Finland	104	Ukraine	4
Poland	100	Bangladesh	3
Belgium	79	Bulgaria	3
Japan	56	Ecuador	3
Portugal	39	Georgia	3
Czech R.	38	Malaysia	3
Austria	34	Slovenia	3
N. Zealand	34	Albania	2
S. Korea	26	Cyprus	2
Ireland	24	Malta	2
Brazil	18	N. Macedonia	2
Hungary	18	Singapore	2
India	17	Slovakia	2
Greece	14	UAE	2

Source: Scopus (2025)

It is noteworthy that the literature on Greenland is dominated by Denmark and the United States (which are rivals in the governance of the region). Studies on Denmark focus on economic and administrative relations

with the region. It can be seen that the political discourse of the US President is supported by academic research. In addition, other countries, such as Russia, are not indifferent to the issue.

5. Conclusion

Greenland is becoming an increasingly attractive region. Taarup-Esbensen and Gudmestad (2022) state that the country will increase its economic potential if it solves the necessary infrastructure problems and minimises delays in the supply chain. Liu et al. (2023) highlight the country's mining potential. Arnaut (2021) stresses that Greenland is undergoing a process of change and points to its potential, particularly in sectors such as fisheries. The importance of the supply chain for the fisheries sector is significant and should not be ignored by investors. Jensen et al. (2024) highlight Greenland's desire for independence from Denmark. In this context, it is stated that the country needs to secure its economic freedom in order to achieve its independence. It is emphasised that fisheries play a crucial role in securing economic freedom. Similarly, for Taagholt and Brooks (2016), mining is seen as important for the country's independence. Both authors believe that Greenland must achieve economic independence in order to achieve independence.

This study is based on a bibliometric analysis of academic publications on Greenland and aims to gain insights into Greenland through this analysis. An analysis of general literature statistics shows that academic publications on Greenland date back to 1860. The Scopus database contains a total of 30,661 documents between 1860 and 2005. However, as this study focuses on social science-oriented research, certain filters were applied and 3,084 documents were included in the study. These documents were published in 861 different sources, indicating that the topic has received widespread attention from the academic community. The number of publications increased by 1.34% per year. In addition, the studies received an average of 24.46 citations per year, demonstrating the academic relevance of the literature. A total of 5,286 different keywords were used in the publications, indicating that the research covered a wide range of topics (Table 2 and Figure 2). The climate issue stands out in the most cited studies (Table 3). Greenland is a region where many issues such as mining, fishing and supply chain are related to climate and environment due to its location in the Arctic Circle. Whatever the topic, Greenland finds its place in academic sources. For example, the journal "Quaternary Science Reviews" hosts 617 publications in this area, showing that it is one of the main academic channels with a strong interest in the topic (Table 4). When analysing scientific publications on Greenland in terms of the institutions to which the authors belong, Danish institutions are the most common (Table 5). Among the trending keywords, climate and environmental issues stand out. However, words related to Greenland's economic structure, such as mining, fishing and tourism, also occupy an important place (Figure 3). When analysing the

distribution of authors of scientific publications by country, Denmark and the USA are in the first two places (Table 6). Considering the political and economic rivalry between these two countries over Greenland today, this finding can be taken as an indication that the rivalry has been going on for a long time in the context of academic studies.

5.1.Limitations of the Study and Future Research

This research was carried out using only the Scopus database, which is a limitation of the research. The reason for choosing a single database is that the Scopus database provided a sufficient number of publications for bibliometric analysis. However, the research can be extended by using different databases. Secondly, by increasing the number of keywords used in the research, a more specific analysis of Greenland can be made. Thirdly, different bibliometric analysis methods can be used, which can change the direction and scope of the research in different ways.

5.2.Theoretical Contribution of the Research and Policy

Recommendations

This study contributes to the literature on Greenland from both an economic and a political perspective. Economically, Greenland has significant potential in various sectors such as mining, fishing and tourism. The changes in the region due to climate change have increased interest in the country. Politically, while Denmark's academic interest in keeping Greenland in its hands is obvious, the strategic interest of the US in the region is also reflected in academic studies. In particular, it can be seen that the US plan to seize Greenland has been analysed in an academic context.

Another theoretical contribution of this research is related to Greenland's administrative problems with the Danish government and the independence process. Some of the Danish government's practices are discussed in terms of human rights. On the other hand, some researchers, such as Grydehøj (2020), emphasise that the independence of the island depends on economic independence. It is argued that in order to achieve economic independence, Greenland must make proper use of its natural resources and economic potential. This may affect Greenland's future political structure and international relations.

In this context, economically developing countries such as Türkiye should first increase their interest in the region at the academic level. Academic research can analyse the economic potential of the region and provide guidance to the business community. In addition, past and present human rights violations in the region, if any, should be analysed and what can be done for the people of the region in light of these violations should be discussed.

Explaining Iceland's loss of Greenland, Thór (2000) states that "they had neither the ships nor the manpower to get to the region". This explanation emphasises access to the region in the context of its fishing potential and the need for international trade. Read in reverse, it can be argued that in order to win Greenland, trade with the region must be increased. For this, it is important to establish transport corridors, especially by sea.

Ethics and Finance Explained

Ethics committee approval: This research does not require ethics committee approval.

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APPENDİCES

Appendix 1. Distribution of publications by years

Year	Paper	Year	Paper	Year	Paper	Year	Paper	Year	Paper	Year	Paper	Year	Paper	Year	Paper	Year	Paper
1860	1	1880	1	1900	0	1920	0	1940	1	1960	3	1980	14	2000	38	2020	157
1861	0	1881	0	1901	0	1921	0	1941	1	1961	4	1981	12	2001	32	2021	150
1862	0	1882	0	1902	0	1922	0	1942	0	1962	2	1982	10	2002	40	2022	137
1863	0	1883	0	1903	0	1923	0	1943	1	1963	2	1983	7	2003	32	2023	167
1864	0	1884	0	1904	0	1924	0	1944	0	1964	1	1984	10	2004	78	2024	153
1865	0	1885	0	1905	0	1925	0	1945	0	1965	3	1985	10	2005	56	2025	9
1866	0	1886	0	1906	1	1926	0	1946	1	1966	7	1986	6	2006	68		
1867	0	1887	0	1907	0	1927	0	1947	0	1967	1	1987	5	2007	60		
1868	0	1888	0	1908	0	1928	2	1948	3	1968	4	1988	20	2008	69		
1869	0	1889	2	1909	2	1929	0	1949	2	1969	3	1989	19	2009	64		
1870	0	1890	1	1910	1	1930	1	1950	2	1970	3	1990	17	2010	112		
1871	0	1891	0	1911	0	1931	0	1951	4	1971	5	1991	20	2011	93		
1872	0	1892	0	1912	0	1932	0	1952	4	1972	6	1992	15	2012	128		
1873	3	1893	1	1913	0	1933	0	1953	4	1973	2	1993	20	2013	136		
1874	9	1894	0	1914	0	1934	1	1954	12	1974	8	1994	17	2014	110		
1875	1	1895	0	1915	0	1935	4	1955	7	1975	12	1995	7	2015	92		
1876	0	1896	0	1916	0	1936	4	1956	7	1976	8	1996	24	2016	147		
1877	1	1897	0	1917	0	1937	3	1957	0	1977	5	1997	26	2017	142		
1878	0	1898	0	1918	0	1938	0	1958	6	1978	7	1998	55	2018	130		
1879	0	1899	2	1919	0	1939	2	1959	2	1979	18	1999	33	2019	133		

Source: Scopus (2025)

Appendix 2. Trends in keywords

Term	Frequency	Year(Q1)	Year(Median)	Year(Q3)	Term	Frequency	Year(Q1)	Year(Median)	Year(Q3)
hydrology	5	1992	1993	2008	greenland ice sheet	62	2013	2016	2020
disko island	6	1999	2000	2003	deglaciation	29	2014	2016	2020
mittivakkat glacier	8	2005	2007	2008	little ice age	22	2011	2016	2022
meteorology	7	2005	2007	2014	inuit	109	2012	2017	2022
gis	6	2000	2007	2017	north atlantic	31	2014	2017	2020
ammassalik island	10	2006	2008	2008	ice cores	20	2014	2017	2020
climate	30	2005	2010	2016	greenland	507	2013	2018	2022
northeast greenland	9	2010	2010	2022	climate change	94	2013	2018	2021
thule culture	8	2010	2010	2012	holocene	86	2015	2018	2021
permafrost	18	2008	2011	2016	stable isotopes	31	2013	2019	2020
east asian monsoon	5	2004	2011	2018	mining	19	2018	2019	2021
sea ice	22	2010	2012	2016	indigenous peoples	16	2016	2019	2020
norse	19	2005	2012	2020	arctic	163	2014	2020	2022
palaeoclimate	17	2007	2012	2016	denmark	37	2018	2020	2022
west greenland	14	1998	2013	2016	paleoclimatology	37	2018	2020	2021
late glacial	9	2012	2013	2017	norse greenland	7	2020	2021	2023
whaling	7	2008	2013	2014	stalagmite	7	2020	2021	2022
paleoclimate	23	2013	2014	2020	baffin bay	6	2018	2021	2022
lake sediments	18	2012	2014	2020	prevalence	14	2018	2022	2023
thule	12	2010	2014	2018	faroe islands	10	2016	2022	2023
iceland	25	2012	2015	2020	covid-19	8	2021	2022	2022
environment	11	2014	2015	2018	arctic tourism	8	2022	2023	2023
tephrostratigraphy	9	2014	2015	2017					

Source: Prepared by the author using Bibliometrix