

Article

Analysis of Public Perception Changes in the Circular Economy Using Text Mining

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Abstract: Background: The circular economy, an economic model that promotes efficient resource utilization and environmental sustainability, has garnered increasing attention in recent years. The enactment of the Circular Economy and Social Transformation Promotion Act in South Korea represents a significant milestone in policy advancement. However, the extent to which public perceptions and attitudes toward the circular economy have changed, as well as the driving forces behind these changes, require further investigation. **Objective:** This study aims to analysis of the changes in the attitudes and perceptions of the Korean public toward the circular economy using text mining techniques. Specifically, it seeks to explore how public perceptions have evolved since the enactment of the Circular Economy and Social Transformation Promotion Act by identifying the key themes and concerns surrounding the circular economy and understanding their underlying causes. **Methods:** The study employs text mining techniques to analyze a large volume of data collected from multiple online platforms using the keywords "circular economy" and "recycling." Analytical methods such as word frequency analysis, network centrality analysis, CONCOR analysis, and topic modeling were used to systematically uncover the structure of public perceptions and the main themes related to the circular economy. The application of text mining techniques in circular economy research is also explained with reference to relevant literature. **Results:** The analysis identified five key themes in public concerns regarding the circular economy: Circular Economy and Resource Utilization, Environmental Protection and Waste Management, Eco-Friendly Technology and Business Development, Carbon Neutrality and Social Responsibility and Energy Transition and Future Development. The findings reveal strong public awareness of issues such as efficient resource utilization, waste management, eco-friendly technological innovation, carbon neutrality goals, and energy transition. **Conclusions:** The analysis identified five key themes in public concerns regarding the circular economy: Circular Economy and Resource Utilization, Environmental Protection and Waste Management, Eco-Friendly Technology and Business Development, Carbon Neutrality and Social Responsibility and Energy Transition and Future Development: The findings reveal strong public awareness of issues such as efficient resource utilization, waste management, eco-friendly technological innovation, carbon neutrality goals, and energy transition.

Keywords: Circular Economy, Recycling, Network Analysis, Awareness

1. Introduction

In the recent years, global problems such as climate change, resource depletion, and environmental pollution have intensified, and circular economy models are increasingly becoming key strategies for countries to address these issues (Yang et al., 2023). The United Nations' Sustainable Development Goals (SDGs) reiterate the importance of the efficient use of resources and sustainable production and consumption and encourage countries to promote the development of a circular economy through policy and technological innovation (Eisenmenger et al., 2020). In this international environment,

the circular economy is not only a new driving force for economic development, but also one of the key pathways to achieve the global goal of carbon neutrality (Wang et al., 2021). The National Assembly of the Republic of Korea passed the 'Act on Promotion of Circular Economy and Society Transformation,' which took effect on January 1, 2024, and completely revised the existing 'Framework Act on Resource Circulation' to promote the transition to a sustainable circular economy society by laying a step-by-step institutional foundation for the establishment of a circular system for the entire cycle of production-distribution-consumption-recycling (Jang et al., 2023). Not only does the law aim to strengthen corporate responsibility for the efficient use of resources and waste management, but at the same time, the government will provide policy support for new technologies and services, providing new entrepreneurial opportunities for companies.

However, the actual public acceptance and perception of these policies and circular economy practices have not been adequately investigated. Through text mining of public discussions on the circular economy on domestic social media, it is possible to understand the actual opinions of the public on issues such as eco-friendly consumption and resource reuse (Lu & Park, 2022). This not only helps assess the effectiveness of policy implementation but also provides an important market base for companies to formulate green marketing strategies (Ginsberg & Bloom, 2004). In addition, as a representative example of an East Asian economy, Korea has a unique cultural and social background in the development of a circular economy, and the study of public perception in Korea will not only enrich the research perspective of the global circular economy but also provide valuable practical experience for policymakers and market participants. Therefore, the study of Korean public attitudes toward the circular economy, which combines the two forces of policy and the market, is a topic of great academic value and practical significance.

The purpose of this study is to systematically analyze the changes in domestic public opinion's perception and attitude toward the concept of circular economy since the enactment of the 'Circular Economy and Society Transformation Promotion Act' using big data text-mining techniques. By collecting and analyzing data from a variety of channels, including social media, news reports, and blogs, we examined the level of public support for circular economy policies, potential questions and concerns, and the impact of policies on society's overall environmental perceptions. The findings will not only shed light on the overall level of public awareness of Korea's circular economy but also provide empirical evidence for policymakers to optimize circular economy-related regulations and promote the achievement of Korea's green development goals.

2. Theoretical Considerations and Prior Research

2.1 Circular Economy

The circular economy is an economic model that aims to achieve sustainability by maximizing resource efficiency and minimizing waste (Korhonen, Honkasalo, et al., 2018). Based on the principle of 'reduce, reuse, recycle, we emphasize the efficient use and recycling of resources (Korhonen, Nuur, et al., 2018). The concept of the circular economy originated with Boulding's "spaceship earth" theory, which emphasizes the finiteness of the earth's resources and the importance of recycling (Boulding, 2013). This model stands in sharp contrast to the traditional linear economy of 'produce, consume, dispose' (Munir et al., 2024). Industrial ecology was the first academic field to study resource recycling, laying the foundation for the formation of a circular economy (Saavedra et al., 2018). The circular economy incorporates cleaner production and comprehensive waste utilization and is fundamentally an ecological economy (Ghisellini et al., 2016). This includes activities related to reduction, reuse, and resource recovery in the processes of production, distribution, and consumption (Zhijun et al., 2012). By replacing the linear growth model with a circular development model, it aims to achieve

greater economic, social, and environmental benefits at lower development costs (Willard, 2012). The process of circular economic development is <Sheet 1>, as follows.

<Sheet 1> Circular Economy Development Process

| Period | Main contents | Author |
|--------------|---|------------------------------|
| 16th century | beginning of the circular economy | (Ilinova & Kuznetsova, 2022) |
| 18th century | classical economists recognised the potential consequences of resource depletion | (Ugalde Hernández, 2021) |
| 1960-1970 | the Rise of Modern Environmental Economics | (Ilinova & Kuznetsova, 2022) |
| 2008-2009 | the Great Recession has increased interest in green growth. | (Ilinova & Kuznetsova, 2022) |
| 21st century | the circular economy is a potential new development paradigm, and the concept of circular economy has been influenced by various schools of thought, including "spacecraft economics", industrial ecology, and bionics. | (Isenmann, 2003) |
| After 2015 | the European Union is actively pursuing the transition to a circular economy | (Hartley et al., 2020) |

The circular economy offers many opportunities but also presents a number of obstacles. These include reducing dependence on raw materials, reducing waste generation and environmental pollution, creating new jobs, improving resource efficiency, and strengthening corporate competitiveness (Korhonen, Honkasalo, et al., 2018). In addition, the circular economy creates opportunities for new recycling and remanufacturing markets, fosters closer connections between companies and their customers, develops environmentally friendly technologies and practices, and facilitates the emergence of new business models, such as leasing (Jensen et al., 2019). However, the development of a circular economy faces several obstacles, including insufficient affordability, lack of standardization, high initial investment costs, and lack of financial support (Rizos et al., 2016). In addition, immature technology, insufficient government policy support, and low consumer awareness and acceptance hinder the widespread implementation of the circular economy (Sopha et al., 2022).

2.2 Prior Research

Business and management research on the circular economy faces barriers to adoption, particularly a lack of knowledge from citizens and businesses regarding circular methods (Stumpf et al., 2021). From a business management perspective, there are six main research streams in the circular economy: strategy, learning and innovation, consumer behavior, supply chains, circular business models, and emerging technologies (Adekola & Sergi, 2016). Future research should focus on bridging this gap and accelerating the transition to a circular economy across sectors. Recent research has explored the application of big data and text mining techniques to advance circular economy concepts (Mahanty et al., 2021). Using topic modeling and text mining, we analyzed the definition of a circular economy, identified key themes, and proposed an integrated framework (Homrich et al., 2018). Structural thematic modeling has been used to investigate the application of artificial intelligence in the circular economy, identify research trends, and suggest future directions (Alhawari et al., 2021). South Korea is making significant efforts towards implementing a circular economy, driven by government policies and private sector initiatives (Serzhena, 2019). The country is transitioning away from fossil fuels and nuclear power towards renewable energy, necessitating a focus on critical raw materials and minerals (Lee & Cha, 2020). South Korea's circular economy strategies are being compared with Japan's, aiming to address challenges and improve policies (Herrador et al., 2022). Extended Producer

Responsibility (EPR) is being utilized to manage plastic packaging waste, with material flow analysis revealing that approximately 3 million tons of such waste was generated in 2017 (Jang et al., 2020). However, recycling rates remain relatively low, with only 13.5% of household plastic packaging waste being recycled.

2.3 Text Mining Analysis

Text mining has become a powerful tool for analyzing big data, especially in the areas of social media and consumer behavior (Hassani et al., 2020). This allows researchers to supplement traditional structured data analysis to extract valuable insights from unstructured text data (Inmon & Nesavich, 2007). This approach is based on macroeconomic analysis, political sentiment analysis. (Barbaglia et al., 2022) It is applied in various fields. Text mining techniques, such as topic modeling, can be used to identify key topics and trends in large amounts of text data (Hassani et al., 2020). These methods have proven effective in tracking social issues, predicting trends, and understanding consumer behavior patterns. As the demand for text data analysis continues to grow, it is expected to play an increasingly important role in decision-making processes and future-oriented research in various fields (Cagnin et al., 2013)

3. Research Methods

3.1 Research project

Text mining techniques, such as topic modeling, can be used to identify key topics and trends in large amounts of text data (Amado et al., 2018). As the demand for text data analysis continues to grow, it is expected to play an increasingly important role in decision-making processes and future-oriented research in various fields (Suh, 2018). In this study, the following research tasks were selected and related keywords were analyzed to investigate the public's perception of the circular economy.

3.2 Data Research Methods and Procedures

The data collection and analysis process in this study was conducted using the big data analysis platform TEXTOM. 2024.2.1~2024.9.10 Citizens first collected big data through Textom to analyze the recent Korean language, with a focus on awareness. Data collection was analyzed by setting the keywords Naver Blog, Naver News, Naver Cafe, Naver Knowledge IN, Web Document Google Facebook, Google News, and Google Web Document as 'circular economy + recycling, which are widely used in Korea. To improve the accuracy of deriving the keywords in this study, stemming analysis was performed to exclude insufficient words, modifiers, suffixes, and characters other than Hangeul. For the refined keywords, TF-ID and N-gram analyses were performed to analyze the frequency of occurrence of words using Textom and to check the weight of how important the words are in a specific document. In addition, degree centrality analysis, which can measure how many times a particular word is connected to other words on the network, was performed at the end of the CONCOR analysis to find clusters and analyze LDA topic modeling.

4. Research Results

4.1 Data Collection

Data were collected and analyzed from February 1, 2024, to September 10, 2024. "Circular Economy" + "Recycling" The data collected on Naver and Google are <Sheet 2>as follows. As a result of data collection, there were a total of 8,907 cases. To improve the accuracy of the keywords in these data, the research task was carried out after insufficient vocabulary.

<Sheet 2> Data Collection Source

| Ingestion Channels | Section | Amount of collection(cases) | Capacity |
|--------------------|-------------|-----------------------------|----------|
| Naver | app | 2,407 | 1.41MB |
| | blog | 3,042 | 1.74MB |
| | news | 925 | 501.52KB |
| | cafe | 464 | 281.74KB |
| | Knowlegei N | 16 | 10.91KB |
| Google | app | 1,356 | 478.74KB |
| | news | 57 | 20.16KB |
| | facebook | 640 | 257.74KB |
| Total | | 8,907 | |

4.2 Frequency Analysis Results, TF-IDF Analysis and N-gram Analysis

Text-type data were subdivided into words through preprocessing and stemming. The frequency of words in a document refers to the total number of words that appear in the document, and TF-IDF is a method that comprehensively considers the occurrence of words in a single document and the distribution of words in an entire set of documents to increase the importance of words in a particular document. As a result of the analysis, the frequency distribution of the top 30 words was as follows.

<Sheet 3> Frequency Analysis Results

| NO. | Keywords | Frequency | NO. | Keywords | Frequency |
|-----|-------------|-----------|-----|----------------|-----------|
| 1 | Rotation | 2510 | 16 | Carbon | 313 |
| 2 | Conjugation | 2152 | 17 | Green | 313 |
| 3 | Economy | 2105 | 18 | Society | 298 |
| 4 | Resource | 1216 | 19 | Construction | 289 |
| 5 | Possibility | 811 | 20 | Production | 253 |
| 6 | Sustainable | 694 | 21 | Material | 235 |
| 7 | Wast | 675 | 22 | Energy | 235 |
| 8 | Environment | 595 | 23 | Transformation | 215 |
| 9 | Plastic | 558 | 24 | Palpation | 213 |
| 10 | Use | 446 | 25 | Innovation | 209 |
| 11 | Technique | 382 | 26 | Future | 201 |
| 12 | Industry | 375 | 27 | South Korea | 195 |
| 13 | Product | 363 | 28 | Business | 180 |
| 14 | Battery | 325 | 29 | Administration | 179 |
| 15 | Enterprise | 322 | 30 | Neutrality | 179 |

<Sheet 4>IF-IDF Frequency Analysis

| NO. | Words | TF-IDF | NO. | Words | TF-IDF |
|-----|-------------|---------|-----|--------------|---------|
| 1 | Resource | 900.635 | 11 | Enterprise | 609.573 |
| 2 | Plastic | 884.686 | 12 | Product | 605.844 |
| 3 | Possibility | 855.302 | 13 | Green | 561.492 |
| 4 | Waste | 849.48 | 14 | Carbon | 553.534 |
| 5 | Last | 819.722 | 15 | Society | 542.357 |
| 6 | Battery | 790.646 | 16 | Material | 520.408 |
| 7 | Environment | 768.56 | 17 | Construction | 499.244 |
| 8 | Technique | 664.531 | 18 | Energy | 491.538 |
| 9 | Use | 635.487 | 19 | Production | 489.978 |
| 10 | Industry | 623.042 | 20 | Innovation | 466.97 |

Resources (900.635) scored the highest and played a central role in the discussion, as resources are closely related to the core concept of the circular economy: "reuse of

resources." Plastics (884.686) indicate that plastics are a key topic in discussions about circular economy and reuse, especially reducing plastic waste and increasing plastic recycling, and that high TF-IDF values indicate that they are frequent and important in the text. The words possible) (855.302) and sustainable (819.722) indicate that the public discussion about the sustainability and feasibility of the circular economy is more focused, suggesting that possibility and sustainability are becoming the focus of the conversation. Waste (849.48) and environment (768.56) are among the words related to the environment and technology; waste management and environmental protection are important in the discussion. Because one of the goals of the circular economy is to reduce waste, the high TF-IDF values of these two terms indicate that the public cares about waste management and overall environmental protection. Batteries (790.646) and technology (664.531) indicate that the application technology of battery recycling is a hot topic in the discussion. Innovation (466.97) and production (489.978) discussed ways to improve production methods through innovative means to recycle resources.

<Sheet 5> N -gram Results of the analysis

| NO. | N-gram (A) | N-gram (B) | Frequency | NO. | N-gram (A) | N-gram (B) | Frequency |
|-----|--------------|--------------|-----------|-----|--------------|----------------|-----------|
| 1 | Rotation | Economy | 1723 | 11 | Waste | Utilization | 82 |
| 2 | Sustainable | Possibility | 632 | 12 | Utilization | Possibility | 77 |
| 3 | Resource | Rotation | 549 | 13 | Economic | Transformation | 76 |
| 4 | Carbon | Neutrality | 178 | 14 | Economy | Construction | 76 |
| 5 | Utilization | Rotation | 138 | 15 | Society | Transformation | 76 |
| 6 | Economy | Society | 117 | 16 | Economy | Active | 75 |
| 7 | Resource | Utilization | 115 | 17 | Battery | Utilization | 75 |
| 8 | Environment | Protection | 102 | 18 | Utilization | Resource | 73 |
| 9 | Rotation | Resource | 102 | 19 | Play | Raw material | 69 |
| 10 | Plastic | Utilization | 97 | 20 | Possibility | Future | 69 |

As can be seen from the results of these N-grams, the discussion is about "circular economy," "sustainability," "resource recycling," "carbon neutrality," and "resource reuse." These high-frequency words are concerned with how the public can achieve effective use of resources and environmental protection through technological innovation, management practices, and policy promotion. In addition, reflecting the application scenarios of specific industries and resources, there is active discussion on plastics, waste reuse, and economic transformation.

1) Connection Centricity Analysis

Before the analysis of thermal crystallinity centrality, the basic characteristics of the network were confirmed to be 20 network nodes. There are 190 Ages.

2) Deriving the impact of words

The image of the connection sympathetic analysis that can determine the degree of centrality of the nodes in the network. Looking at the 10 keywords of Notzle, it was found that they were circulation, utilization, economy, resources, possible, sustainability, waste, environment, plastics, and use. It can be seen that this is forming the context of environmental sustainable development.

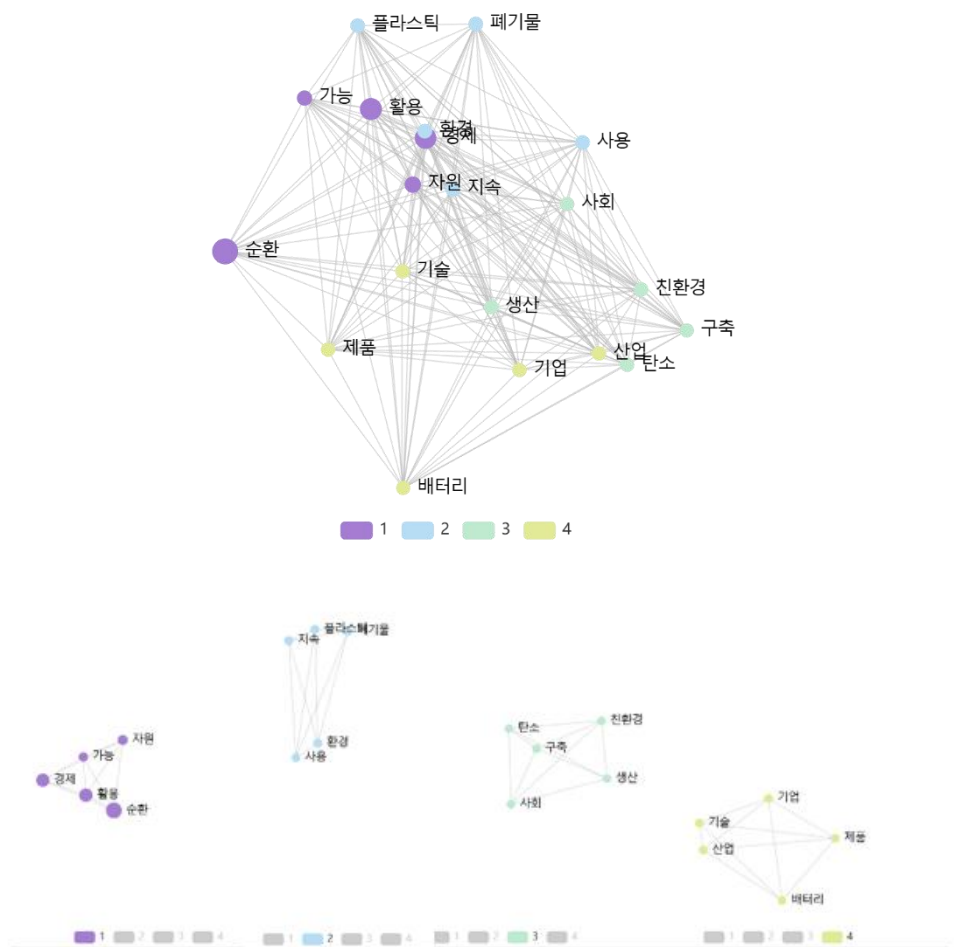
<Sheet 6> Connection centrality analysis results of top keywords

| NO. | Keywords | PageRank |
|-----|-------------|----------|
| 1 | Rotation | 0.136 |
| 2 | Utilization | 0.117 |
| 3 | Economy | 0.120 |
| 4 | Resource | 0.081 |
| 5 | Possibility | 0.062 |
| 6 | Sustainable | 0.057 |
| 7 | Waste | 0.049 |

| | | |
|----|--------------|-------|
| 8 | Environment | 0.043 |
| 9 | Plastic | 0.033 |
| 10 | Use | 0.035 |
| 11 | Technique | 0.031 |
| 12 | Industry | 0.031 |
| 13 | Product | 0.030 |
| 14 | Battery | 0.023 |
| 15 | Enterprise | 0.027 |
| 16 | Carbon | 0.025 |
| 17 | Green | 0.027 |
| 18 | Society | 0.026 |
| 19 | Construction | 0.025 |
| 20 | Production | 0.023 |

4.3 CONCOR analysis

<Picture 1> CONCOR Visualization results



These four clusters reflect the different dimensions and key issues of a circular economy. First, Cluster 1 focuses on the core concepts and economic dimensions of the circular economy, emphasizing the importance of sustainable economic development through the effective recycling of resources, using terms such as 'circular, utilization, ' and 'economy.' These terms form the basic logic of a circular economy, which reflects the balance between resources and affordability. Next, Cluster 2 focuses on environmental

protection and waste management, especially the treatment of 'waste' and 'plastics,' which shows the importance of waste management and sustainable resource utilization for environmental protection, which are currently key issues in the field of environmental protection. This shows the importance of waste management and sustainable resource utilization for environmental protection, which is currently a hot topic in the field of environmental protection. Cluster 3 focuses on social responsibility and production, using terms such as 'carbon' and 'eco-friendly' to reflect how companies are fulfilling their social responsibilities to promote green development and low-carbon production. These terms indicate that environmental practices at the social level are closely related to the goal of carbon neutrality, and are a social extension of the development of a circular economy. Cluster 4, on the other hand, focuses on the combination of technology and enterprise level, especially 'technology' and emerging technologies such as 'batteries', reflecting the importance of technological innovation for enterprise and industry development. The cluster shows enterprises' enthusiasm for the application of green technologies and how technological innovations can be used to promote the development of a circular economy. The above four clusters encompass the four main areas of the circular economy: core concepts, environmental issues, social responsibility, and technological innovation, and reflect the comprehensive development path of the circular economy from various angles, as follows.

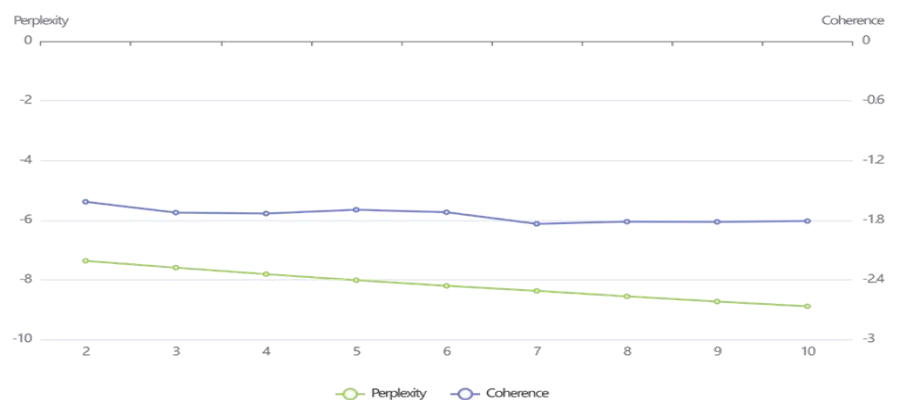
<Sheet 7> Clustering Analysis Results

| Category | Cluster name | Configuration node |
|----------|---|---|
| 1 | The basic concept of the circular economy and its viability at the economic level | Circulation, Utilization, Economy, Resources, Possible |
| 2 | Emphasizing the importance of environmental protection and waste management | Sustainable, Waste, Environmental, Plastic, Use |
| 3 | Emphasis on the need for social responsibility, low-carbon production and green development | Carbon, Eco-friendly, Society, Construction, Production |
| 4 | Technological innovation and the key role of companies in promoting the circular economy | Technology, Industry, Product, Battery, Company |

4.4 Topic Modeling Analysis Results

As a result of analyzing the complexity and scope of the topic analysis, it was divided into 10 topics. The 10 topics effectively cover all major aspects, and there is a lot of overlap in word frequencies between different topics, which can be summarized in five main themes: Topic (A) Circular Economy and Resource Utilization, Topic (B) Environmental Protection and Waste Management, Topic (C) Green Technology and Corporate Development, Topic (D) Carbon Neutrality and Social Responsibility, and Topic (E) Energy Transition and Future Development.

<Picture 2> Topic Reliability Analysis Results



Topic (A), Keywords for Circular Economy and Resource Utilization include many keywords related to the core concepts of the circular economy, such as 'economy,' 'circulation,' 'utilization,' 'resources,' and 'possible.' These words are frequent and focus on discussing how to promote economic development through resource recycling, which is a key concept in the circular economy. Topic (B), Environmental Protection and Waste Management, focuses on the terms "waste," "environment," "plastic," "use," and "disposal," and mainly deals with the recycling of plastics and waste, with the aim of reducing environmental impact and improving the efficiency of resource use. Topic (C), Green Technology and Enterprise Development covers 'technology,' 'enterprise,' 'industry,' 'battery,' and explores how enterprises can promote sustainable industrial development through technological innovation and green product development with "products," "innovation" and other terms. Topics (D), 'carbon,' 'society,' 'environmental protection,' 'buildings,' and 'sustainable' are the keywords of carbon neutrality and social responsibility. And 'sustainable' reflects the societal need for low-carbon and environmental protection, as well as the role of companies and countries in achieving sustainable development. Finally, the energy transition and future development focus on 'energy,' 'transition,' 'future' and 'neutrality.' Topic (E) Energy Transition and Future Development focuses on the terms 'energy,' 'transition,' 'future' and 'neutrality' and discusses the impact of energy restructuring and energy neutrality on the future development of the circular economy.

5. The results of the study

This study analyzes citizens' perspectives and concerns about the circular economy by text-mining their discussions on an online platform. Through word frequency analysis and topic modeling, five major themes were identified: "Circular Economy and Resource Utilization," "Environmental Protection and Waste Management," "Green Technology and Enterprise Development," "Carbon Neutrality and Social Responsibility," and "Energy Transition and Future Development." These topics reflect the public's interest in and understanding of various aspects of the circular economy, providing comprehensive insights. First, on the topic of "circular economy and resource utilization," keywords such as "economy," "recycling," "utilization," and "resources" appeared frequently. It can be seen that the core of Korean people's interest in the circular economy is how to promote sustainable economic development through the recycling of resources. This topic highlights the need for the effective management and reuse of resources, especially in resource-poor countries such as South Korea, where reducing dependence on imported resources through a circular economy is noted. The keyword "possibility" was also mentioned in the discussion, indicating that they are very interested in the practical applicability of the circular economy and believe that this model can bring new economic growth opportunities.

Second, in the theme of "environmental protection and waste management," keywords such as "waste," "environment," "plastic," "use," and "treatment" show that the public is very concerned about environmental pollution, especially plastic waste. Plastic, which is an indispensable material in modern life, places a heavy burden on the environment. In South Korea, topics such as waste recycling and reducing the use of plastics have been widely discussed, reflecting the urgent need to protect the environment. In particular, the government's strict waste management policies have further improved public environmental awareness, raising expectations regarding waste disposal methods and resource waste reduction.

Third, "Green Technology and Corporate Development" is a theme that emphasizes technological innovation and the sustainable development of enterprises. Keywords such as "technology," "enterprise," "industry," "battery," "product," etc., reflect the public's interest in the important role of technological progress in the circular economy. Battery technology and other green technologies are widely discussed as an important part of the future low-carbon industry. As a frontline country for global

technological innovation, South Korea has great potential for companies to develop green economies and sustainable products. Technological innovation can not only promote the extension of product life cycles but also improve competitiveness in the global market. Technological progress is widely regarded as one of the key driving forces in promoting the circular economy and sustainable development of businesses.

Fourth, the keywords of the theme of Carbon Neutrality and Social Responsibility, such as 'carbon, society, environmental protection, construction, and 'sustainability, show a close connection between carbon emission issues and social responsibility. South Korea has been strengthening its carbon neutrality policy in recent years, showing great public interest and support for the realization of the carbon neutrality goal, which is not only concerned about the role of the government and companies in reducing emissions but also believes that individuals should take corresponding responsibilities to reduce their carbon footprint and promote green consumption. This shows that Korean society recognizes carbon neutrality as an essential element for achieving sustainable development in the future. During the discussion, the public expressed high expectations about the role that businesses and the government will play in this process.

Lastly, the keywords of the theme of 'Energy Transition and Future Development,' 'Energy,' 'Transition,' 'Future,' and 'Neutrality,' reflect Korean society's concerns about the adjustment of the energy structure and the direction of future development. As the demand for renewable energy increases worldwide, discussions on energy transition are also becoming more active in Korea, especially on how to replace existing fossil fuels with clean energy and achieve energy neutrality. It is widely accepted that energy transition is not only a key step towards carbon neutrality, but will also have a profound impact on the future social and economic structure. As a result, balancing economic growth and energy consumption and effectively promoting the use of renewable energy technology has emerged as a hot issue in Korean society.

6. Conclusion

Based on the results of the analysis of these five topics, the following conclusions were drawn. South Korea's understanding of the circular economy has a strong hierarchy that encompasses not only the efficient use of resources and waste management, but also green technology innovation, net-zero goals, and the long-term development of the energy transition. The development of a circular economy is widely regarded as an effective way to tackle environmental crises, as well as an important way to promote economic innovation and sustainable social development. Technological innovation, government policy support, and broad participation from all sectors of society are the key factors in promoting the development of a circular economy.

This study shows a multilayered perception of Korea's circular economy through text mining and provides a useful reference for policymakers and business managers. In the process of promoting the circular economy, Korea should further increase investment and R&D in green technologies, formulate more future-oriented policies, and raise awareness of environmental protection and sustainable development throughout society. At the same time, the results of this study provide the academic community with empirical data on the public's perception of the circular economy. Future research will be able to further explore the changing trends in public perception and the interaction between various topics to provide more comprehensive theoretical and practical support.

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