A Role of Artificial Intelligence in the Context of Economy: Bibliometric Analysis and Systematic Literature Review

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Abstracts: This bibliometric analysis aims to explore and assess the multifaceted impact of technology on the economy through a comprehensive review of academic literature. By systematically examining a wide range of research articles, this study intends to provide insights into the various ways in which technology influences economic growth, productivity, innovation, and other key indicators. The analysis will identify trends, influential authors, and prominent journals in the field, shedding light on the evolving relationship between technology and the economy. The paper might highlight a gap in research on how AI is being adopted and leveraged in developing economies. The actual research gaps addressed in the paper will depend on the findings of their systematic literature review and bibliometric analysis. The significance of this paper reflects a recognition that AI has become a driving force behind innovation, productivity improvements, and competitive advantage across industries. The main objective of this research is to use bibliometric analysis to investigate the publication output about artificial intelligence, using data sourced from the Scopus database, to contribute to economic improvement. The data has been gathered using specified terms, including "artificial intelligence, technologies," and "economy," with a focus on the fields of business management, accounting, and computer sciences. The bibliometric analysis included the use of Scopus to gather data, using VOSviewer, Rstudio, and Excel as analytical tools. The data collection spanned from 2016 to 2023. The primary aims of this work are doing a comprehensive bibliometric analysis, examining the co-citation structure, analyzing keyword co-occurrence, and conducting a geographical analysis within the domain of artificial intelligence and economics. The research yields findings about the implications of publishing in the field of artificial intelligence and its impact on business, management, accounting, and computer science from an academic standpoint. This article aims to assist scholars and business experts seeking to construct contemporary company structures, serving as a valuable resource for future endeavors in this field.

Keywords: Economy, Artificial Intelligence, Machine learning, Systematic Literature Review, Bibliometric Analysis.

1. INTRODUCTION

Technology has become an integral part of modern society, profoundly shaping economies around the world. The rapid advancement of technology has led to transformative changes in various sectors, influencing economic activities and contributing to both positive and negative outcomes. This bibliometric analysis aims to delve into the extensive body of scholarly work addressing the impact of technology on the economy, offering a comprehensive overview of the research landscape and identifying emerging patterns.

Artificial intelligence plays a crucial role in facilitating compelling operational reforms throughout the bulk of modern organizational structures. Artificial intelligence, which encompasses the principles of robots emulating human thought, behavior, and performance, has become a crucial undertaking for commercial companies (Aloini et al., 2018; Ammar et al., 2018). The field of artificial intelligence was first established by scientist John McCarthy and was officially introduced at the Dartmouth Conference in 1956. Since then, it has become a prominent focus for numerous organizations (Balugani et al., 2018; Balugani et al., 2019; Kumar et al., 2019). Artificial intelligence (AI) is a field within computer science that encompasses the development of expert systems, algorithms, and programs (Aldasoro et al., 2019; Colicchia et al., 2019). The primary objective of artificial intelligence is to replicate the cognitive abilities of the human brain and effectively engage in decision-making processes analogous to those shown by human beings across diverse settings and conditions (Lopes de Sousa Jabbour et al., 2018; Deshpande et al., 2018).

In practical terms, machine or equipment capability is defined by its capacity to engage in cognitive processes, acquire knowledge, and exhibit behavior akin to that of humans. While the inception of artificial intelligence dates back to 1956, its significance has been increasingly recognized in recent years (Dolgui et al., 2018; Felfel et al., 2018). Artificial intelligence is well recognized for its computational capacities, data processing skills, and use of genetic algorithms (He & Yang, 2018). Artificial intelligence greatly enhances the computational capabilities of

CPUs. The availability of vast quantities of data about fields such as medical, weather, defense, and other related sectors, together with the simultaneous reduction in both the time and expense required for data upkeep, serves as an exemplary illustration (Nebl & Schroeder, 2011; Chaouch, 2018). Artificial intelligence may be classified into two main categories: limited artificial intelligence and general artificial intelligence. The former pertains to rudimentary matters such as the coordination of corporate events and schedules, as well as the resolution of customer care inquiries. Nevertheless, the latter domain encompasses intricate matters such as the operation of automobiles, the development of robots, and the mitigation of language barriers (Breja et al., 2011; Choi et al., 2018; Dupont et al., 2018). According to many sources (Brown, 2013; Fatorachian & Kazemi, 2018), the projected value of artificial intelligence-driven business development is anticipated to reach $3.9 trillion by the year 2022. This represents a significant growth of 70 percent compared to the previous year, as the value stood at $1.2 trillion in 2018.

The concept of a circular economy aims to disrupt the linear model of the traditional gather-manufacture-discard economy. Instead, it proposes a system where goods are seen as valuable resources that may be continuously used in subsequent production processes. This shift towards a circular economy seeks to minimize waste and maximize the possibilities for reusing and recycling materials. The concept revolves around the production of long-lasting, reparative, and transformative items, to facilitate their rental, borrowing, or sharing wherever feasible. The objective is to investigate the origin of waste by examining its upstream processes, specifically focusing on the design and manufacturing of items that contribute to trash formation. Another fundamental aspect of the circular economy framework is the substitution of the end-of-life notion with restoration, therefore transitioning towards the use of renewable energy sources and eliminating the use of harmful compounds that impede the process of reuse and reintroduction into the biosphere (Ghisellini et al., 2016). Therefore, the concepts of a circular economy may be defined as i. implementing strategies that eliminate pollution, ii. prolonging the lifespan of goods as much as possible, and iii. using natural systems that are capable of being reused (Rathinamoorthy, 2019).

Artificial intelligence has the potential to be used as an advanced method for attaining the circular flow inside the economy. Numerous scholarly studies have used Artificial Intelligence (AI), Machine Learning (ML), and Data Mining methodologies in their investigations of the circular economy. (Alavi et al., 2021) have suggested a nonlinear decision support system that incorporates the concept of zero-waste manufacturing. This system utilizes Machine Learning techniques to effectively manage and consolidate the criterion scores for providers inside a circular supply chain. Their study, (Rakhshan, 2018) proposes a probabilistic prediction model that utilizes advanced supervised machine learning algorithms to evaluate the potential reusability of load-bearing construction materials after a structure has reached its maximum capacity. The use of artificial neural networks and nonlinear regression techniques has been employed in the development of a heat recovery system for the carbon fiber manufacturing process. The heat recovery system described in the study effectively preserves mechanical qualities while capturing and reusing heat. It has been shown to conserve up to 64% of the total heat generated, leading to a closed-loop heat flow throughout the whole manufacturing process (Khayyam et al., 2021). The utilization of artificial intelligence has seen a rise in prominence throughout the era of the fourth industrial revolution. Approaches within AI, such as machine learning and data mining, are being progressively embraced (Sarker, 2021; Tang & Liao, 2021).

However, the emergence of artificial intelligence has brought up a variety of possible benefits, leading to a series of unsolved research inquiries that need additional clarification. The research questions are proved in bibliometric analysis. Bibliometric indicators, co-citation structures, and geographical analyses provide insights into the research landscape and trends within a specific field. In the context of the intersection between artificial intelligence (AI) and economics, these analyses can help identify influential authors, key research topics, collaboration patterns, and geographic distribution of research activity. Here's how these concepts apply:

RQ1: What are the key bibliometric indicators, co-citation’s structure, and geographical analysis in the field of artificial intelligence and economics?

RQ2: Factors investigated for improving the economy in business, management, accounting, and Computer sciences (Through thematic analysis).

RQ3: What are the keywords mainly discussed in this study (Through bibliometric analysis)?

The objective of the study Bibliometric Analysis and Systematic Literature Review" is to comprehensively examine and analyze the impact, trends, and research landscape surrounding the integration of artificial intelligence (AI) within the domain of the economy. This study aims to achieve the specific objectives. Conduct a systematic literature review to identify and categorize the main themes, concepts, and trends related to the utilization of artificial intelligence in various aspects of the economy. Perform a bibliometric analysis to quantify the research output in terms of publications, citations, and collaborations related to the role of AI in the economy. This analysis aims to provide a quantitative assessment of the growth and influence of this research area. This study contributes to the academic discourse on the intersection of artificial intelligence and the economy by offering a rigorous analysis of existing literature, trends, and research trajectories. The study aims to expand the understanding of how AI is reshaping economic activities and systems. This study holds significant importance within the fields of artificial intelligence (AI), economics, and interdisciplinary research. The study provides a comprehensive and systematic analysis of the integration of AI into the economy. By combining a bibliometric analysis and a systematic literature review, it offers a well-rounded understanding of the current state of research, trends, and the impact of AI on economic activities. By bridging the fields of AI and economics, the study promotes interdisciplinary collaboration. Researchers from both domains can benefit from a deeper understanding of how AI innovations intersect with economic principles and practices.

The subsequent sections of the text are structured in the following manner. Section 2 provides an overview of the background research. Part 3 of the paper delves into the technique used, while part 4 focuses on the bibliometric analysis, which is further divided into other subsections. In conclusion, our study was finished by engaging in a comprehensive discussion of the limits encountered throughout the research process, as well as proposing potential avenues for future research exploration in section 5.

2. THEORETICAL BACKGROUND

Artificial intelligence includes every machine or equipment that uses computational abilities to work and perform like humans or replace humans (Mishra et al., 2018, 2019). Artificial intelligence is the process of manufacturing enabled by machines that can imitate human activities originally (Alexander Douglas & Yvonne Coleman, 2013; Chung, 2018; Nie et al., 2019).

Pei et al. (2019) opine that artificial intelligence enables programs that when put into any computational device initiate the thinking capability of machines. Contemporarily, the trend of robotic cars is extremely evident. Such driverless cars are gathering attention from users due to their highly technologically equipped design that can obey traffic rules, control speed, and several other similar functions without human intervention (Porselvi et al., 2018; Prajogo et al., 2018). The contrary to existing and expected benefits of artificial intelligence, Qiu et al. (2018) draw attention to the side effects of technology. The author further highlights the dependability of humans on technology and connects it with the notion that excess of everything is bad. Similarly, the speed at which humans are adopting tech-savvy life seems a little dangerous (Karapetrovic, 2010; Liu et al., 2018).

In reaction, a limited number of distinguished scholars argue that abstaining from technology in the contemporary day is a fundamentally unwise decision. Technological interventions have a significant role in the everyday routines of people (Ray, 2018). According to Ren et al. (2019), expert systems enable the execution of essential parts of human existence by simulating cognitive abilities similar to those possessed by humans. The system exhibits human-like behavior to address analytical challenges, replicates visual and speech impairments, and comprehends and resolves language barriers. The four primary components of expert systems encompass the knowledge base, which encompasses the accumulation of factual information and rules derived from human experts. The inference engine pertains to the critical problem-solving techniques employed. The scheduler manages the sequence of tasks related to the specific problem at hand. Lastly, the user interface facilitates effective interaction between multiple concurrently running programs (Petridis & Dey, 2018; Shibin et al., 2018).

Artificial intelligence (AI) is a very significant technology that offers a multitude of benefits via the use of diverse algorithms, facilitating a seamless shift towards an economy (E). Examples of applications in various domains include real-time data analysis for supply chain management (Awan et al., 2021), cost reduction (Wang & Zhang, 2020), and carbon footprint reduction (Płoszaj-Mazurek et al., 2020) for sustainable development. Additionally, processes can be automated (Schlüter et al., 2021) for reverse logistics, the impact of waste generation can be assessed [30,31] for waste management, and different materials can be sorted (Nañez Alonso et al., 2021) for recycling purposes. Furthermore, artificial intelligence (AI) can serve as a crucial facilitator of comprehensive systemic change, particularly in the conversion of unprocessed data into effective decision-making techniques. Numerous studies have been published that delve into the aforementioned concerns, with scholars mostly concentrating on the transition from a linear economic model to a circular economic model via the adoption of various solutions for recycling, reusing, and remanufacturing (Stock & Seliger, 2016; Rajput & Singh, 2021). In the field of computer engineering, artificial intelligence (AI) has the potential to facilitate autonomous and remote monitoring of industrial efficiency as well as the life cycles of products (Ghoreishi & Happonen, 2020). Mukrimaa et al. (2016) assert that a significant volume of data is generated during the many stages of a product's lifecycle, including production, consumption, and disposal. Artificial intelligence (AI) has the potential to be used proficiently to examine the aforementioned data to advance these operations. In their study, Ghoreishi and Happonen, (2020) discovered that the use of circular design tools and processes in enterprises may effectively enhance product circularity with the aid of artificial intelligence. The use of artificial intelligence (AI), Internet of Things (IoT) ideas, 3D printing, advanced robotics, wearable devices, and augmented reality (AR) has brought about significant transformations in supply chains, logistics, and asset management technologies (Mukrimaa et al., 2016).

3. METHODOLOGY

Bibliometrics is a research field that involves quantitative analysis of publications, citations, and other bibliographic data to evaluate and understand the impact, influence, and trends within the scientific and academic community. It provides insights into the relationships between keywords, authors, journals, articles, and disciplines. Bibliometric methodology encompasses a range of techniques and metrics used to study these patterns. Analyzing the relationships between citing and cited documents can reveal patterns of influence and intellectual connections within a field. Co-citation analysis and bibliographic coupling are techniques used to build citation networks. Investigates collaborations between authors to identify trends in team science and interdisciplinary research. Co-authorship networks show how authors work together. Visualization techniques like citation maps and co-citation maps provide a visual representation of the connections between keywords, articles, authors, countries, and journals in a field.

The present investigation centers on quantitative research methodology. This research investigates a collection of 2207 papers obtained from the Scopus database, spanning the years 2015 to 2023, to conduct a bibliometric analysis (Bonilla et al., 2015). The data has been gathered via the use of particular terms, including artificial intelligence, technology, and economics. This research analyzed the topics of papers on Artificial Intelligence, Bibliometrics, Economy, Business, Management, and Accounting, as well as Computer Sciences viewpoints. The selection of the Scopus database was based on a comprehensive and diverse range of references, abstracts, and study summaries, following established protocols (Fink, 2019). Content analysis is a methodological approach used for investigation purposes, whereby a combination of VOSviewer and MS Excel software is utilized to systematically arrange and categorize a collection of diverse documents about a certain topic (Massaro et al., 2016). Scopus encompasses a vast collection of over 90 million contemporary documents, including 17 million researcher profiles, 80,000 institutional profiles, and access to 7,000 publishers. The database serves as a reliable and efficient source for accessing comprehensive academic information on a worldwide scale, and it undergoes frequent updates to ensure its currency. The significance of the h-index, which quantifies the status of a publication, author, or book, is challenging to refute (Hirsch, 2005).

In this investigation, the VOSviewer program (version 1.6.15) was used (www.vosviewer.com; Hirsch, 2005). The list was then processed to generate a file that adheres to the prescribed structure and format for network analysis. The VOSviewer program is a freely available application used for the creation and development of

bibliometric networks. A mapping visualization was generated to enhance the understanding and analysis of the bibliographic data and to gain more comprehensive insights into the bibliometric results of the study topics. Furthermore, the VOSviewer software was equipped with a text-mining capability. The use of this approach has been seen within a corpus of scholarly literature to visually represent and build co-occurrence networks that are interconnected with certain topic domains.

3.1 Co-Citation Analysis

This method has been used by Small (1973) co-citation analysis is a technique used in bibliometric research to understand the relationships between scientific papers based on their citation patterns. It focuses on identifying and analyzing the co-citation patterns of documents, which are documents that are cited together by other documents. This method helps researchers explore the intellectual structure of a field, identify key concepts or themes, and discover influential or seminal works. The basic idea behind co-citation analysis is that if two documents are frequently cited together by other documents, they are likely to be related in terms of content, ideas, or research topics. This forms the basis for mapping out the intellectual connections and relationships within a particular field of study (Cobo et al., 2011). Apply network analysis techniques to the co-citation network to identify clusters or groups of closely related papers. This can help reveal the thematic structure of the field and highlight key works that are frequently co-cited (Small & Garfield, 1985).

3.2 Keyword Analysis

In the context of bibliometrics, keyword analysis involves studying the keywords or terms used in scholarly publications to understand trends, topics, and themes within a particular field of research. This analysis can provide insights into the evolution of research areas, the terminology used by researchers, and the connections between different studies (Guo et al., 2019). Researchers can analyze the co-occurrence of keywords within publications to identify patterns of frequently co-occurring terms. This can help uncover the main themes and relationships between different con Keywords can be clustered based on their co-occurrence patterns. Clusters represent groups of related terms, allowing researchers to identify core topics within a research domain (Aria & Cuccurullo, 2017; Guo et al., 2019).

3.3 Geographical Analysis

Geographical analysis in bibliometrics involves studying the geographical distribution of research output, collaboration patterns, and other bibliometric indicators across different regions, countries, or institutions. This analysis can provide insights into the global landscape of research activity, collaboration networks, and the impact of research on different geographic scales (Aria & Cuccurullo, 2017).

According to Donthu et al. (2021), researchers analyze the production of scientific publications, patents, and other research outputs on a country or region level. This can help identify trends in research activity and productivity. Geographical analysis can reveal patterns of international and national collaboration between researchers and institutions.

3.4 Thematic Analysis

Thematic analysis of textual data obtained by text mining is a kind of unstructured ontological inquiry used to investigate intricate subjects, with a particular focus on the authors' writing style. The primary aim of this approach is to systematically, objectively, and purposefully evaluate the material included in the current corpus of literature (Biesenthal & Wilden, 2014). The use of qualitative content analysis on the designated sample facilitates the investigation of various sources, such as written texts. Researchers may benefit from performing more extensive investigations by using technology tools to examine study streams (Elo & Kyngäs, 2008).

The analysis performed by Massaro et al. (2016) clustering techniques, such as k-means clustering, can group publications based on similarity in terms of keywords, citations, or other relevant features. Beyond keywords,

content analysis can involve analyzing abstracts, titles, and full-text content to identify recurring themes and concepts using RStudio and VOSviewer software. Visualization tools and techniques, such as word clouds, network graphs, and topic maps, can help represent and explore the identified thematic patterns. Analyzing thematic shifts over time can provide insights into how research topics have evolved and which areas are gaining prominence (Chen, 2006).

4. RESULTS AND FINDINGS

In bibliometrics, the results and findings of research often provide quantitative insights into various aspects of scholarly communication, scientific impact, and the structure of academic knowledge. These findings are derived from the analysis of publication and citation data. Here are some common results and findings that can emerge from bibliometric studies. Publication Trends: Bibliometric analysis can reveal patterns in the publication output over time, showing how the volume of research has changed in a specific field or discipline. Researchers can uncover collaboration networks and identify patterns of co-authorship, both within and across institutions and countries. Bibliometrics can be used to measure the impact of individual articles, journals, authors, or institutions based on the number of citations they receive. Researchers can analyze the citation patterns of a publication to understand which other works it references and how it is being used in subsequent research. By analyzing the citation frequency of articles in a journal, bibliometric analysis can calculate the journal's impact factor, which is often used as a measure of journal quality. Researchers can identify prolific authors and analyze their publication output and citation impact. Bibliometrics can show how different fields of research are interconnected through shared references and co-citations, revealing trends in interdisciplinary collaboration. By identifying clusters of related keywords or terms, bibliometrics can uncover emerging research topics within a field. Through citation analysis, researchers can identify highly cited works that have significantly influenced the development of a particular field. Bibliometric analysis can pinpoint geographic locations or institutions that are particularly active in specific research areas. Bibliometrics can measure the degree of international collaboration by analyzing the geographic distribution of co-authored papers. Visualizations, such as co-citation networks and keyword maps, can provide a visual representation of the intellectual structure of a field. Researchers can analyze the research output and citation impact of different countries, offering insights into global research contributions. Author H-Index: Bibliometrics can calculate an author's h-index, which represents their productivity and citation impact. Bibliometric analysis can contribute to assessing the overall impact and influence of individual researchers. These are just a few examples of the types of results and findings that can arise from bibliometric studies. The specific results will depend on the research questions, dataset, and methods employed in the analysis. This section reveals the research questions. Data has been collected from 2207 published documents by Scopus from 2015 to 2023 against the specific keywords. All analyses were performed by using VosViewer and RStudio tools.

The first publication of 2014 is noteworthy due to its presentation of concepts on the provision of technical assistance to workers via the implementation of intelligent user interfaces that accurately represent a cyber-physical world and the corresponding interactions within it. In addition to technology methods, the study highlights the need to implement appropriate qualification techniques that will foster the necessary interdisciplinary comprehension for Industry 4.0. After the first publication stage, researchers showed a renewed interest in this subject continuously yearly.

The use of 6039 keywords indicates a thorough examination of the matter from several perspectives. Moreover, the term "keywords plus" suggests that the frequency of keywords often found in article titles is almost 10 times greater than the total number of articles. In all, the investigation includes a cohort of 6563 writers, with an average citation count of 2.44 per publication. The findings of this research indicate that there was a very limited amount of scholarly attention towards the problem under investigation over the chosen timeframe, as seen by the average number of citations. Fig. 1 It seems like you might be referring to a visual representation or a figure that summarizes the main information about data in the context of bibliometrics. Fig. 2 represents the metric that provides insights into the volume of research output and can be used to track trends and changes in research activity over time. By examining the annual scientific productions, researchers can identify periods of growth, decline, or stability in a

particular field, and they can also compare research productivity across different regions, institutions, or areas of study.

MAIN INFORMATION ABOUT DATA	
Description	**Results**
MAIN INFORMATION ABOUT DATA	
Timespan	2015:2023
Sources (Journals, Books, etc.)	837
Documents	2207
Annual Growth Rate %	26.38
Document Average Age	2.44
Average citations per doc	17.05
References	127819
DOCUMENT CONTENTS	
Keywords Plus (ID)	6757
Author's Keywords (DE)	6039
AUTHORS	
Authors	6563
Authors of single-authored docs	247
AUTHORS COLLABORATION	
Single-authored docs	253
Co-Authors per Doc	3.43
International co-authorships %	31.45
DOCUMENT TYPES	
Article	1234
Book	87
book chapter	280
conference paper	391
conference review	30
Editorial	9
Note	1
Retracted	3
Review	172

Figure 1. Shows the main information about the data

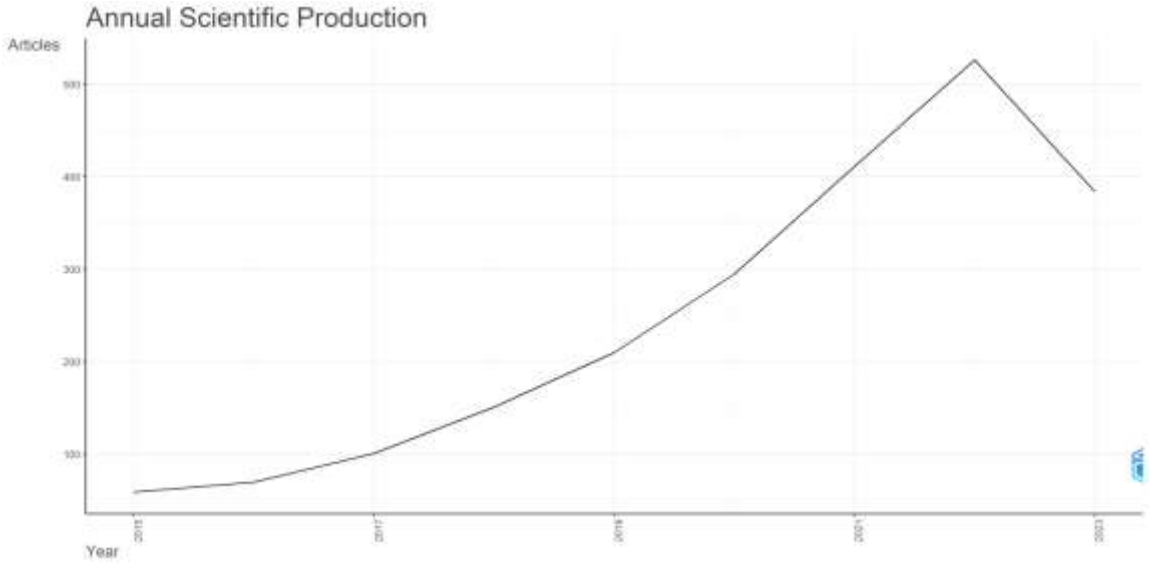

Figure 2. Annual scientific productions

4.1 Co-Citation Analysis

Co-citation analysis is a bibliometric method that involves identifying and analyzing the relationships between scholarly documents based on their shared citations by other documents. It aims to uncover connections and intellectual associations between works in a particular field of study. In co-citation analysis, two documents are considered co-cited if they are both cited by a third document, indicating a potential thematic or conceptual link between them.

4.1.1 Co-Citations of Journals

Co-citation analysis of journals is a bibliometric technique that involves identifying and analyzing the relationships between academic journals based on the shared citations of their articles by other works. This analysis aims to uncover connections, similarities, and thematic associations between journals within a specific research field or discipline. It can provide insights into the intellectual structure of a field, the influence of journals, and the patterns of scholarly communication.

Table 4.2 represents the top 10 most active sources with the articles, citations, and total link strength. The first top source of this table is Sustainability with 363 articles, 4564 citations, and 1401 total link strength. The second most cited source is “Journal of Cleaner Production” with 252 articles, 12653 citations, and 2403 strengths. The 3rd source is “Technological Forecasting and Social Change” with 46 articles, 2823 citations, and 812 total link strength. There are are total of 53 items, 9 clusters, 386 links, and 6301 are the total link strengths. Fig. 3 represents most top sources with size, colors, and nodes. The big size shows that they are a top source of Sustainability, the Journal of Cleaner Production, and some others with unique colors. Fig. 4 shows the most productive source with publications.

4.2 Most active source			
Sources	**Articles**	**Citations**	**Total link strength**
Sustainability (Switzerland)	363	4564	1401
Journal of Cleaner Production	252	12653	2403
Technological forecasting and social change	46	2823	812
Business strategy and the environment	41	1446	1583
Lecture notes in networks and systems	38	46	62

Acm International Conference proceeding series	23	51	40
Advances in intelligent systems and computing	21	90	36
Applied Sciences (Switzerland)	19	389	269
Ifip advances in information and communication technology	19	94	149
Smart innovation, systems, and technologies	18	30	179

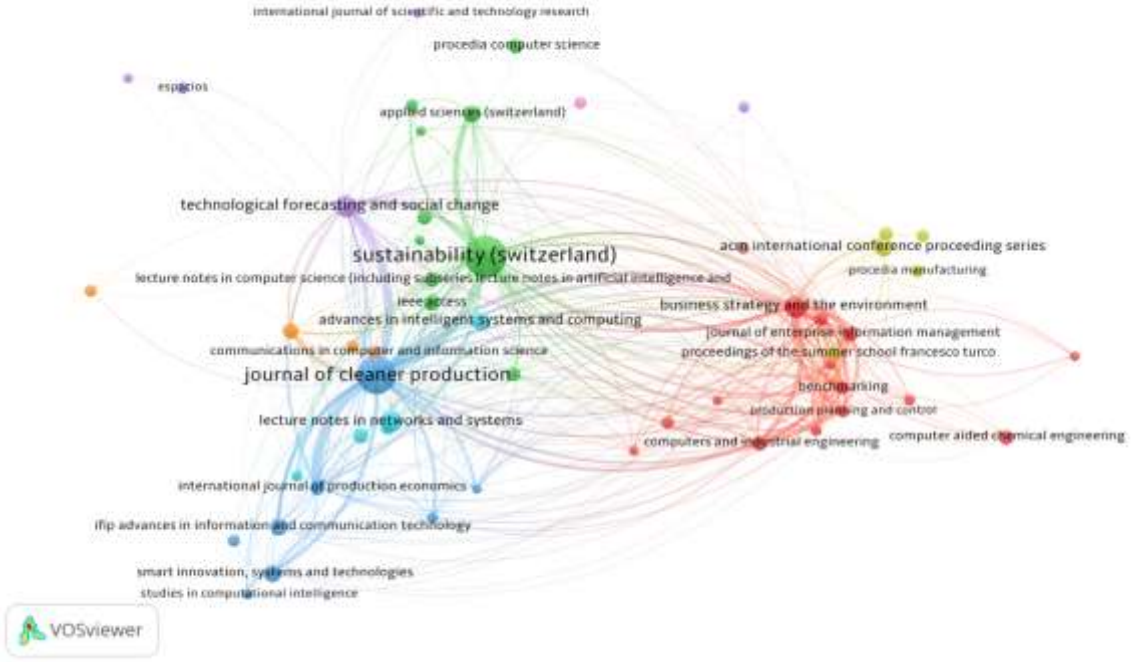

Figure 3. Shows the most productive source

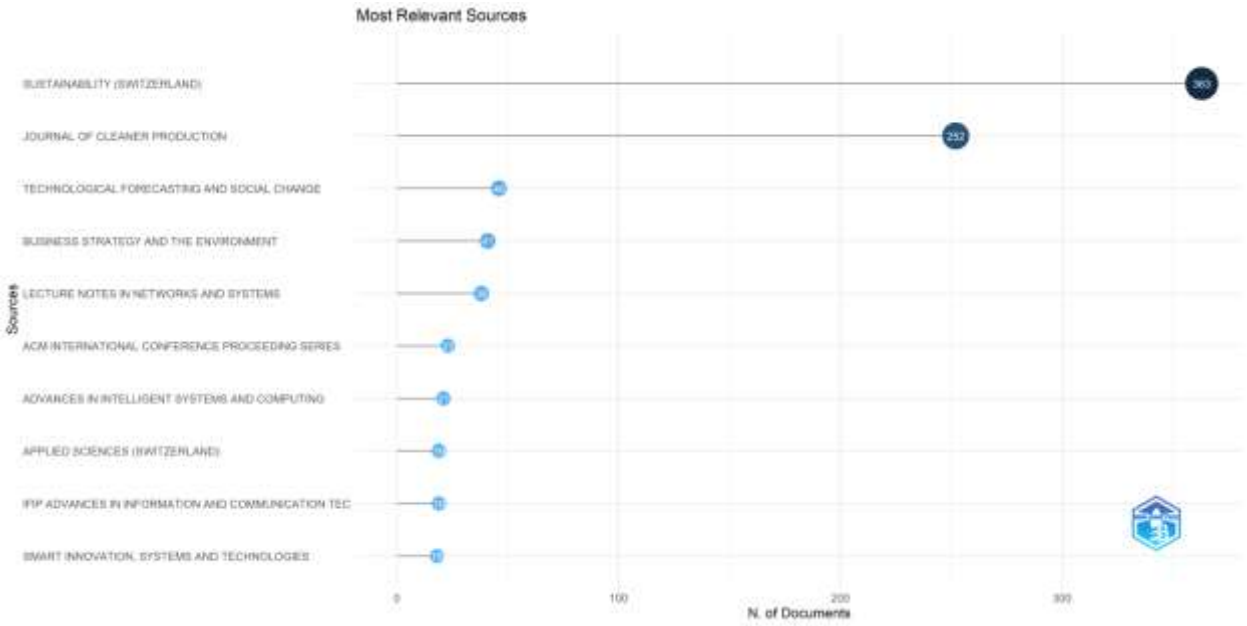

Figure 4. Shows the most productive source with publications

4.1.2 Co-Citation of Authors

The co-citation of authors is a bibliometric analysis that focuses on the co-citation patterns of authors' works. It involves identifying and analyzing the connections between authors based on the shared citations of their respective works by other documents. This analysis aims to uncover relationships, collaborations, and intellectual associations between authors within a particular research field or discipline.

Fig. 5 shows five areas such as blue, green, red, purple, and yellow. The blue area deals with the obstacles and potential advantages associated with disruptive digital technologies in promoting circularity within supply chains. A comprehensive examination of 187 publications is conducted using bibliometric analysis and systematic literature review (SLR) to discover and categorize different factors that influence, facilitate, impede, and present difficulties. The red area explains determinant exhibits a restricted impact on enhancing the overall innovation quality of agricultural product processing firms and does not function as a prerequisite for achieving exceptional innovation quality. The integration of entrepreneurship and green technology capabilities significantly contributes to enhancing the level of innovation quality inside agricultural product processing firms. The green area circular economy may be defined as a regenerative system that aims to minimize resource input and reduce waste, emissions, and energy leakage by implementing strategies to slow down close, and narrow material and energy loops. The aforementioned objectives may be accomplished by the implementation of strategies such as durable design, regular maintenance, effective repair practices, the promotion of reuse, remanufacturing processes, refurbishment efforts, and the adoption of recycling practices. The purple area defines that organizations are progressively using social media platforms as a means to present and promote their services and resources to users. Instagram, specifically, is used as a means to target a demographic consisting of younger individuals. Finally, the yellow area explains Industry 4.0 refers to the fourth industrial revolution characterized by the integration of digital technologies, automation, data exchange, and smart manufacturing processes. Flexibility, in this context, refers to the ability of systems, processes, and organizations to adapt, adjust, and respond to changes and demands dynamically and efficiently.

Table 4.3 displays the ranking of the ten writers who have produced the greatest number of publications and articles that have been fractionalized. The author who has the highest number of publications is Kumar A., with a total of 19 articles. Furthermore, 4.28 articles, representing a percent, are attributed to the blue region. One of the leading second authors in the field is Garza-Reyes JA. With a total of 11 articles, including 2.24 articles fractionalized that have been fractionalized, this statement is inaccurate. Mangla SK is ranked as the third most prominent novelist. The presence of 11 articles, with 3.10 articles being fractionalized, situates this inside the blue region. Fig. 5 shows the five areas with various colors. Fig. 6 shows the most relevant authors.

Table 4.3 Most Cited Authors

Authors	Articles	Articles Fractionalized
Kumar a	19	4.28
Garza-reyes ja	11	2.24
Mangla sk	11	3.10
Wang y	11	3.75
Luthra s	9	2.18
Sarkis j	9	3.42
Kazancoglu y	8	1.73
Li j	8	2.22
Singh s	8	2.65
Wang j	8	1.85

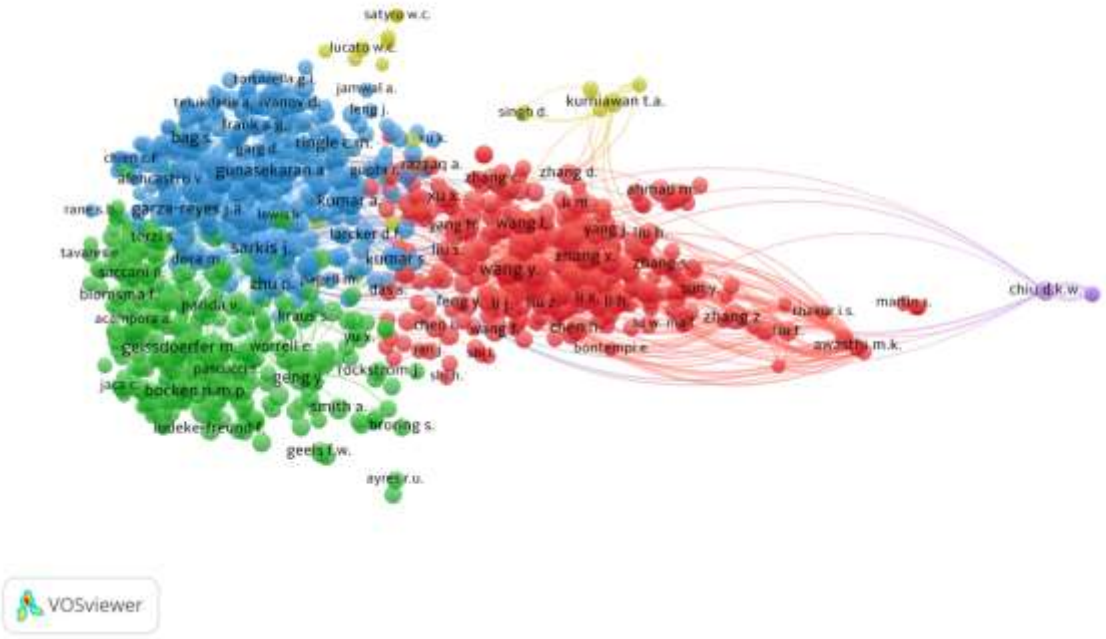

Figure. 5 Shows the most productive authors

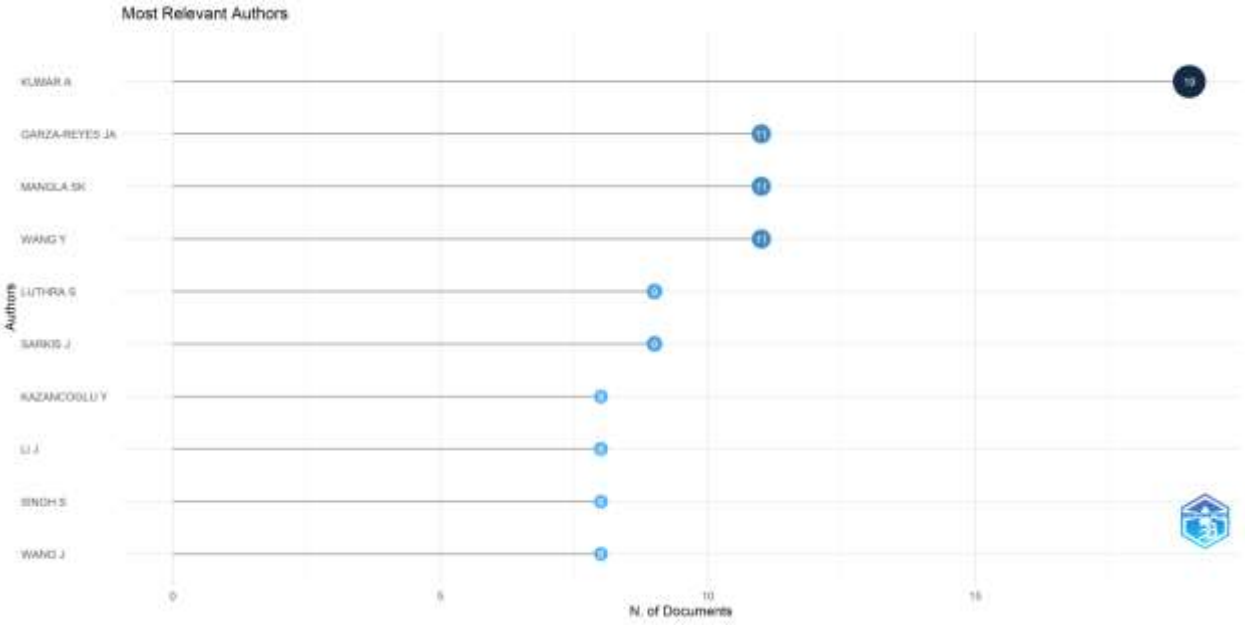

Figure 6. Shows the most relevant authors

4.1.3 Co-Keywords Analysis

Co-keyword analysis, also known as keyword co-occurrence analysis, is a bibliometric technique used to explore the relationships between keywords or terms in a collection of scholarly documents. This analysis involves identifying and analyzing the frequency with which certain keywords appear together within the same documents.

Co-keyword analysis can provide insights into the thematic structure of a research field, identify research trends, and uncover the relationships between different concepts (Aria & Cuccurullo, 2017); (Guo et al., 2019).

Co-keyword analysis can help researchers gain a deeper understanding of the conceptual landscape of a research field, identify important concepts and themes, and track changes in research focus over time. It is a valuable tool for literature review, identifying collaboration opportunities, and exploring the intellectual structure of a specific area of study.

The aforementioned methodology has been used to conduct a keyword co-occurrence analysis using bibliographic data from the Scopus database. Once the data was obtained from VOSviewer, the user proceeded to pick the "keyword co-occurrence" option. Then, a thesaurus file was generated and imported into VOSviewer. The map network was then established, and a table illustrating the co-occurrence of keywords was generated. The text mining methodology produces a visual representation that interprets the closeness of phrases as a reflection of the relationship between different keywords. In summary, it can be deduced that a direct relationship exists between the extent of the separation among five keywords and the level of connection between the respective phrases. Hence, a selection of 788 keywords has been made.

Table 4.4 presents a visual representation of the 10 most significant keywords, showcasing their respective frequencies of occurrence, total connection strength, and associated percentages. The top leading keyword is “sustainable development” with 791 occurrences, and 5291 total link strength. The second leading keyword is “innovation” with 167 occurrences, and 1005 total link strength as well as the 3rd keyword is “economics” with 160 occurrences, and 1164 total link strength. The visual depiction in Figure 7 illustrates co-occurrences, where keywords are organized in decreasing order of magnitude and represented by circles. This arrangement demonstrates that larger keywords are indicative of a greater level of potency inside the search context. Furthermore, it is important to acknowledge that the utilization of identical hues functions as a discernible marker for a search cluster, which may be interpreted as a method of classifying interconnected topics.

Table 4.4: Most frequent keywords

Keyword	occurrences	total link strength
Sustainable development	791	5291
Innovation	167	1005
Economics	160	1164
Industry 4.0	157	848
Decision making	125	993
Artificial intelligence	120	743
Environmental technology	117	1087
Economic and social effects	92	790
Life cycle	92	755
Climate change	88	614

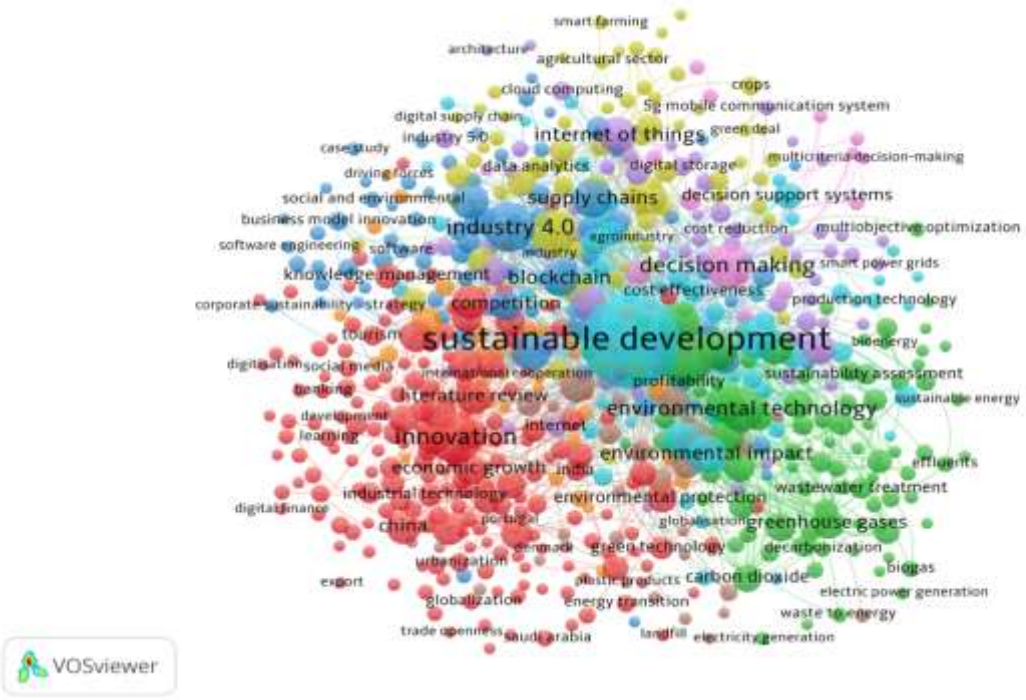

Figure 7. Shows the most frequent keywords

4.2 Geographical Analysis

Geographical analysis, also known as spatial analysis, is a research methodology that focuses on understanding patterns, relationships, and trends in geographic space. It involves the examination of geographic data to uncover insights about spatial distributions, interactions, and variations. Geographical analysis is widely used in various fields, including geography, urban planning, environmental science, economics, epidemiology, and social sciences. This analysis aims to answer questions related to the spatial dimensions of phenomena and how they relate to each other across different locations. Geographical analysis provides valuable insights into spatial trends, enabling researchers to make informed decisions and policy recommendations in various disciplines.

4.2.1 Country Total of Articles

This section evaluates the countries that make substantial contributions to the academic discussion on the subject and analyzes the internal dynamics inside these states. Table 4.5 represents the top 9 countries with the publication and frequency. This column lists the table showing the ranking of countries based on the number of articles for which they have corresponding authors. The country with the highest number of articles is ranked first. The table allows you to quickly identify the countries that have the most corresponding authors for the articles in the dataset. Countries with higher numbers in the "Number of Articles" column have a larger presence as corresponding authors in the research field or dataset. The table highlights the countries that are actively contributing to research and taking a lead role in authorship. Countries with higher numbers in the "Number of Articles" column have a larger presence as corresponding authors in the research field or dataset. The table highlights the countries that are actively contributing to research and taking a lead role in authorship. China is a top leading country with 195, publications, 122, as well as India is the second leading country with 137 publications in various areas. Furthermore, the United Kingdom is the third leading country with 120 publications.

Figure 8 presents the most cited countries. Figure 9 to provide a visual representation, you can map the corresponding author's countries on a geographical map using tools like RStudio. Figure 10 depicts the production of scholarly articles or research outputs from different countries over a specific period, while Figure 11 shows the

most cited countries and would likely represent the countries that are frequently cited in scholarly articles, indicating their influence and contributions to research. Fig. 12 a map showing country scientific production typically visualizes the volume of scientific publications produced by different countries across geographic regions. This map provides a clear visual representation of the research output and contributions of various countries on a global scale.

Table 4.5: Most relevant countries by the corresponding author

Country	Articles	SCP	MCP	Freq	MCP_Ratio
China	195	122	73	0.088	0.374
India	137	107	30	0.062	0.219
United Kingdom	120	53	67	0.054	0.558
Italy	114	75	39	0.052	0.342
Spain	70	52	18	0.032	0.257
Germany	67	44	23	0.03	0.343
USA	67	39	28	0.03	0.418
Brazil	49	29	20	0.022	0.408
Malaysia	43	20	23	0.019	0.535

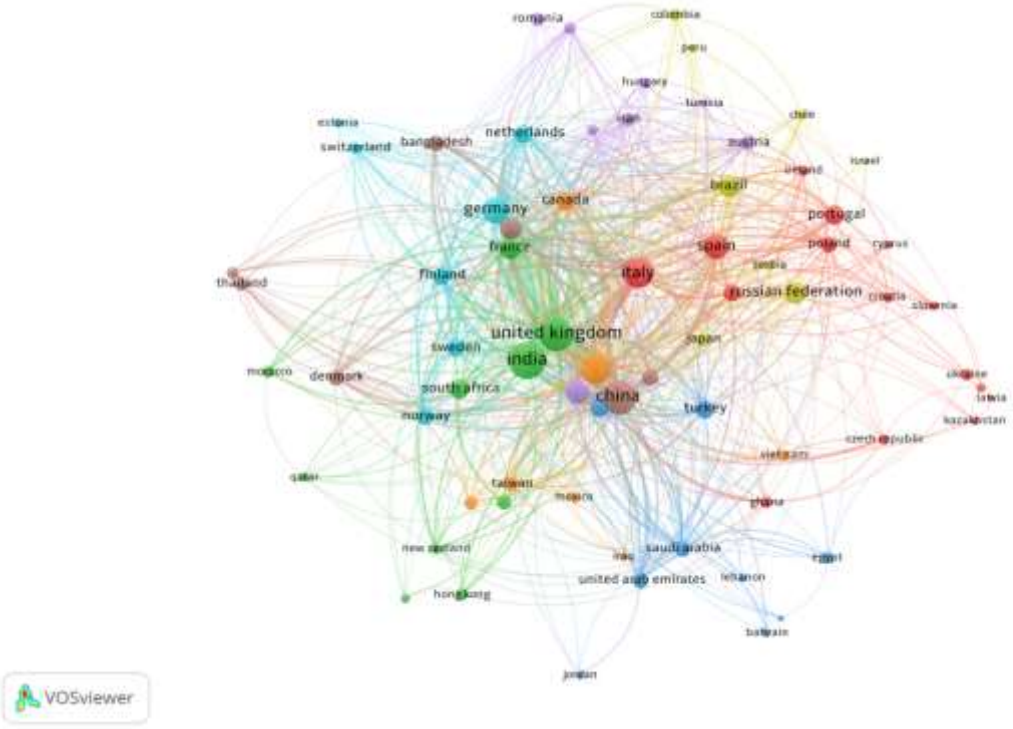

Figure 8. Shows most publications county

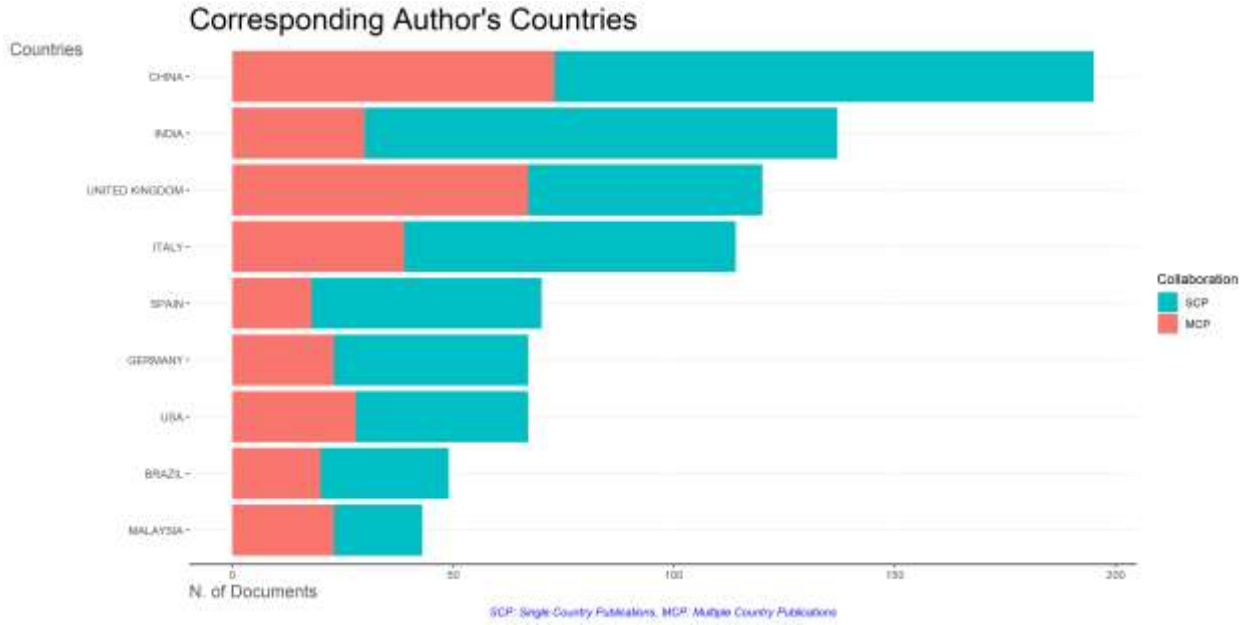

Figure 9. Corresponding Author's Countries

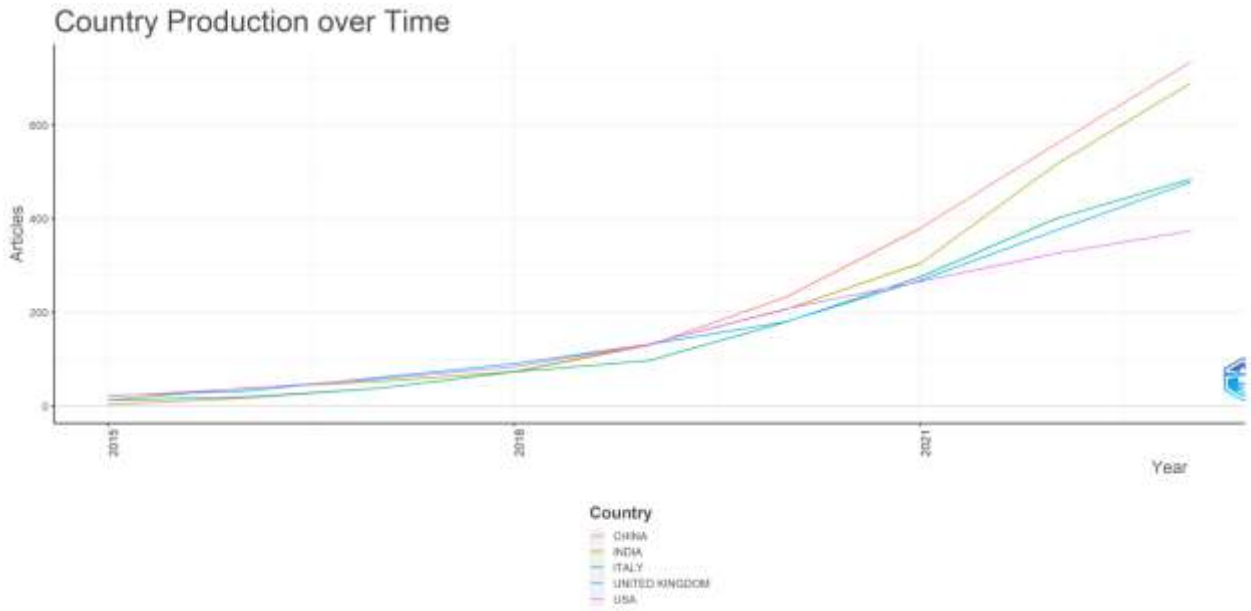

Figure 10. Country production over time

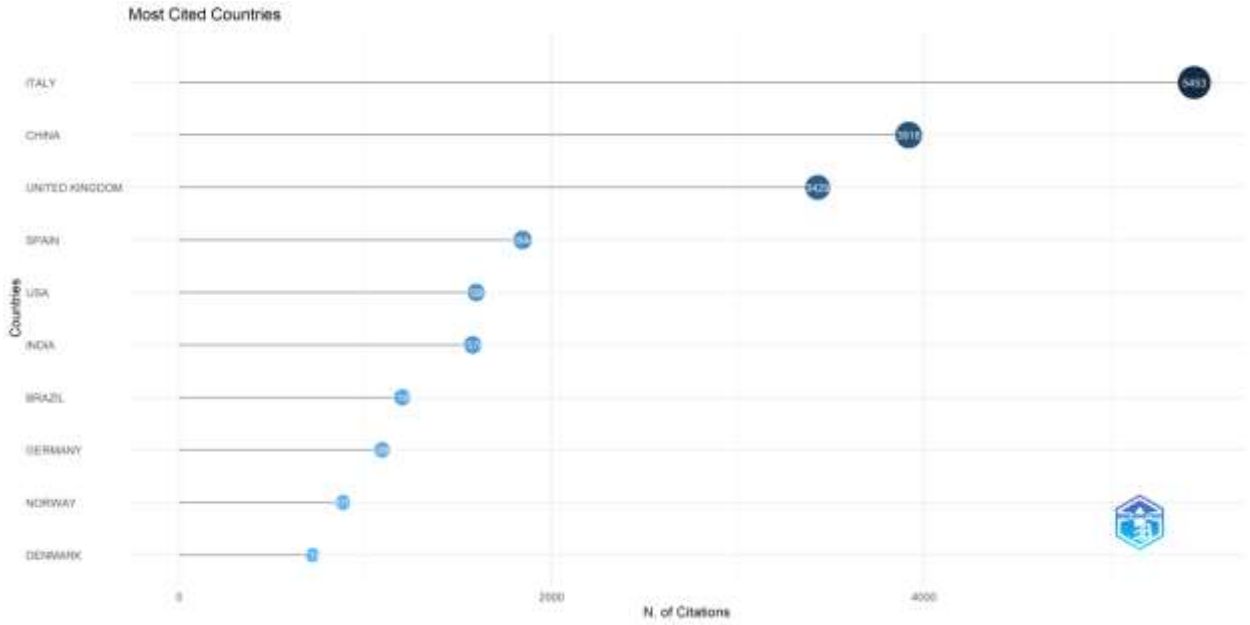

Figure 11. Most cited countries

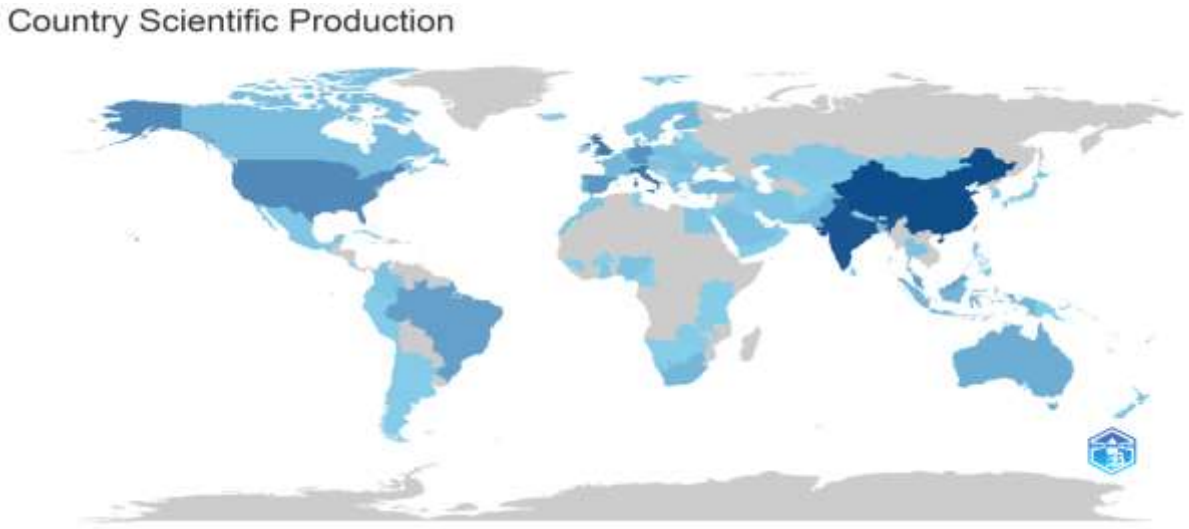

Figure 12. Shows county scientific production

4.3 Thematic Analysis

Thematic analysis in bibliometrics adds depth to quantitative analyses by exploring the underlying content and meaning of scholarly documents as well as addressing research question 2. It can provide insights into the research topics, trends, and intellectual structures present in a field, complementing the quantitative insights gained through bibliometric techniques.

Thematic analysis provides context to quantitative bibliometric findings. It helps explain why certain trends or patterns are emerging by delving into the themes and topics addressed in scholarly literature. It uncovers emerging or novel research themes that might not be readily apparent through quantitative analysis alone. It identifies topics that are gaining traction in the literature. Thematic analysis also helps explain collaboration patterns by identifying common themes that bring researchers together from different disciplines and geographic locations.

Table 4.6 represents the top 10 factors that affect the economy. Artificial Intelligence (AI) has the potential to significantly enhance the economy across various sectors and industries. Here are several ways in which AI can contribute to economic growth and improvement (Mhlanga, 2021). Supply chain management (SCM) plays a crucial role in enhancing the economy by optimizing the flow of goods, services, and information across various stages of production, distribution, and consumption. A well-managed supply chain can have a positive impact on multiple facets of the economy (Håkansson & Persson, 2004). Climate change itself does not typically enhance the economy; rather, it poses significant challenges and risks to economies and societies around the world. The impacts of climate change, including rising temperatures, sea-level rise, extreme weather events, and changing ecosystems, can lead to negative economic consequences. These consequences may include damage to infrastructure, reduced agricultural productivity, increased healthcare costs, and disruptions to supply chains (Popp, 2006). Recycling can have positive economic impacts by contributing to job creation, resource conservation, energy savings, reduced waste disposal costs, and the development of new industries (Razzaq et al., 2021). Waste management plays a vital role in enhancing the economy by promoting sustainability, resource conservation, job creation, reduced environmental costs, and improved public health. Effective waste management practices contribute to both short-term economic benefits and long-term economic resilience (Ogunmakinde et al., 2022). Smart cities enhance the economy by leveraging technology, data, and innovation to create efficient, sustainable, and livable urban environments. The integration of smart technologies in various aspects of urban life has the potential to drive economic growth and improve the quality of life for residents (Joshi et al., 2016).

Fig. 13 shows thematic maps provide a visual representation of spatial data, making complex information easier to understand and analyze. They are commonly used in fields such as geography, urban planning, environmental science, sociology, and economics. Fig. 14 depicts a thematic map by clusters, often referred to as a cluster map, which displays geographic areas that have been grouped based on certain similarities or characteristics. Fig. 15 represents a thematic map based on keywords that involves visualizing the geographic distribution or concentration of specific keywords or terms across different regions. Tables 4.7 and 4.8 factorial analysis in bibliometrics enables researchers to delve beyond simple descriptive statistics and explore the underlying structures and patterns within the scholarly literature. It assists in identifying research trends, collaboration networks, and thematic clusters, providing valuable insights for understanding the landscape of scientific knowledge. Fig. 16 and 17 also show the factorial analysis in diagrams. Fig. 18 shows a country collaboration map that helps you visualize and communicate international research partnerships and collaborations in a specific field or area of interest.

Table 4.6: Thematic analysis

Occu.	Words	Cluster	Cluster_Label	btw_centrality	clos_centrality	pagerank_centrality
80	artificial intelligence	3	artificial intelligence	331.3	0.002	0.009747659
70	supply chain management	3	artificial intelligence	238.2	0.002	0.008197045
66	climate change	3	artificial intelligence	328.8	0.002	0.008920817
68	Recycling	3	artificial intelligence	422.8	0.002	0.007857682
69	waste management	3	artificial intelligence	290.9	0.002	0.008825844
49	smart city	3	artificial intelligence	147.5	0.002	0.004897068
37	carbon dioxide	3	artificial intelligence	187.7	0.002	0.006272037
40	environmental protection	3	artificial intelligence	221.1	0.002	0.006107603
27	public policy	3	artificial intelligence	155.5	0.002	0.003700873
25	emission control	3	artificial intelligence	96.6	0.002	0.004507975

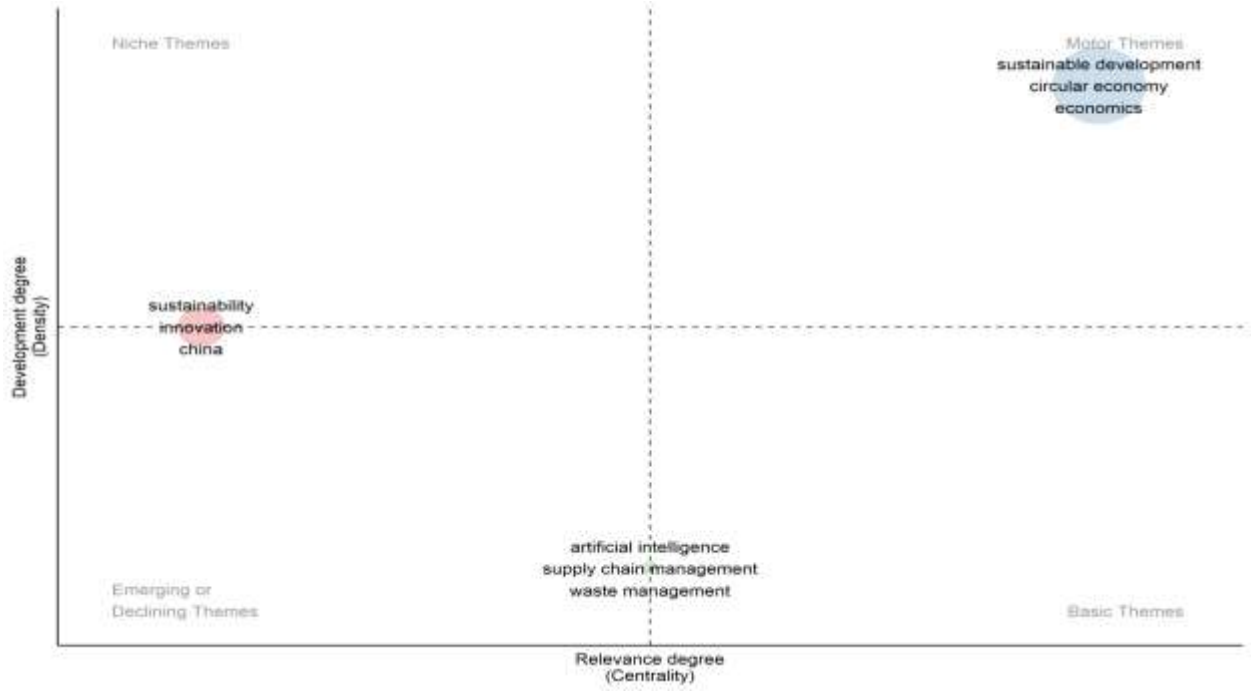

Figure 13. Thematic map

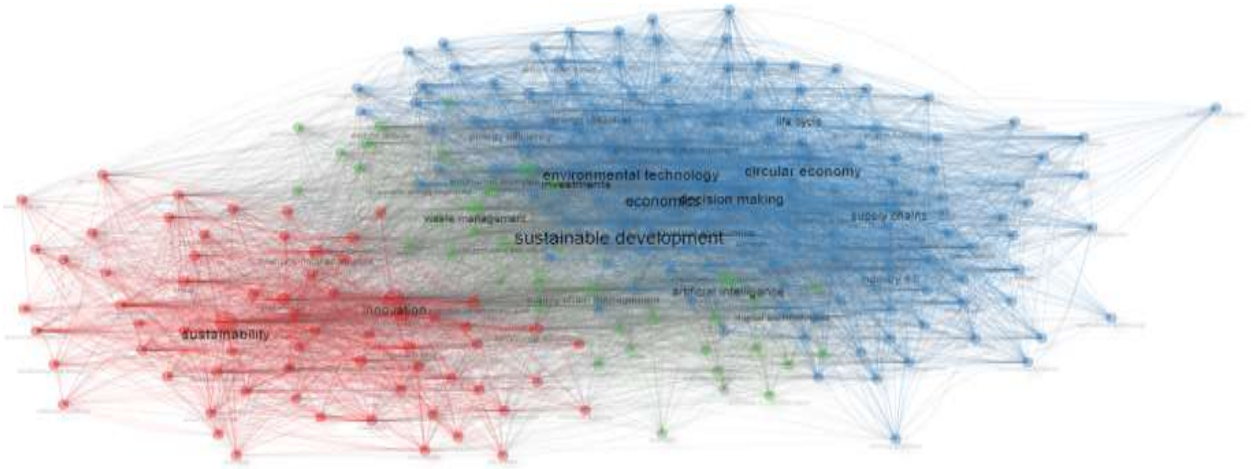

Fig. 14. Thematic map by clusters

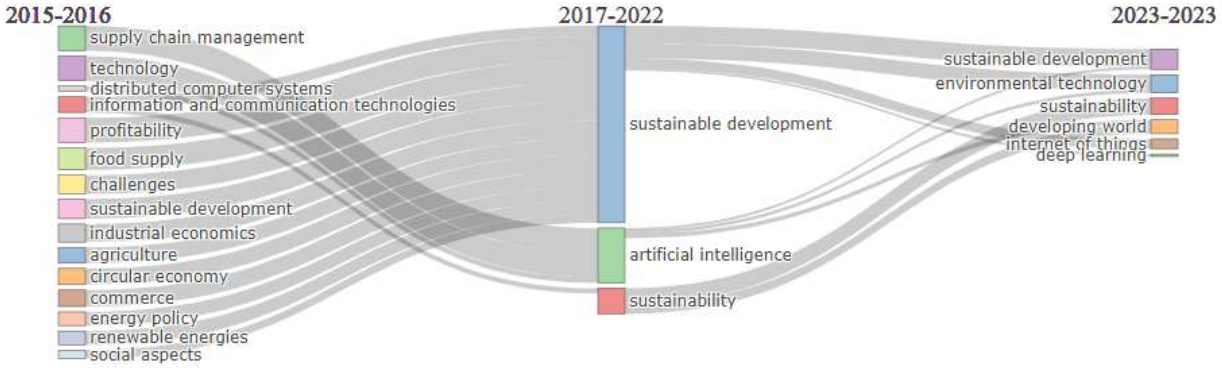

Figure 15. Thematic map by keywords

Table 4.7: Factorial Analysis			
Word	**Dim.1**	**Dim.2**	**cluster**
Sustainable development	0.49	0.06	1
Sustainability	-1.11	0.28	1
Circular economy	0.86	-0.79	1
Economics	0.69	0.7	1
Decision making	0.58	-0.39	1
Innovation	-0.92	0.88	1
Environmental technology	1.18	1.13	1
Economic and social effects	0.97	0.47	1
Life. Cycle	1.34	0.17	1
Supply. Chains	0.84	-1.3	1

4.8: Factorial Analysis by Clusters

Documents	dim1	dim2	contrib	TC	Cluster
Ghisellini p	0.07	-0.15	0.05	2698	1
Hamari j	0.06	0.03	0.01	1868	1
Nascimento dlm	0.19	-0.31	0.24	434	1
Kamble ss	0.2	-0.46	0.46	427	1
Du k, 2019	-0.13	0.75	1.09	366	1
Farooque m	0.12	-0.14	0.06	316	1
Kristensen hs	0.16	-0.29	0.19	304	1
Añón higón d	0.67	0.81	1.85	302	1
Despeisse m	-0.04	-0.3	0.17	280	1
Muñoz p	-0.04	0.02	0	251	1

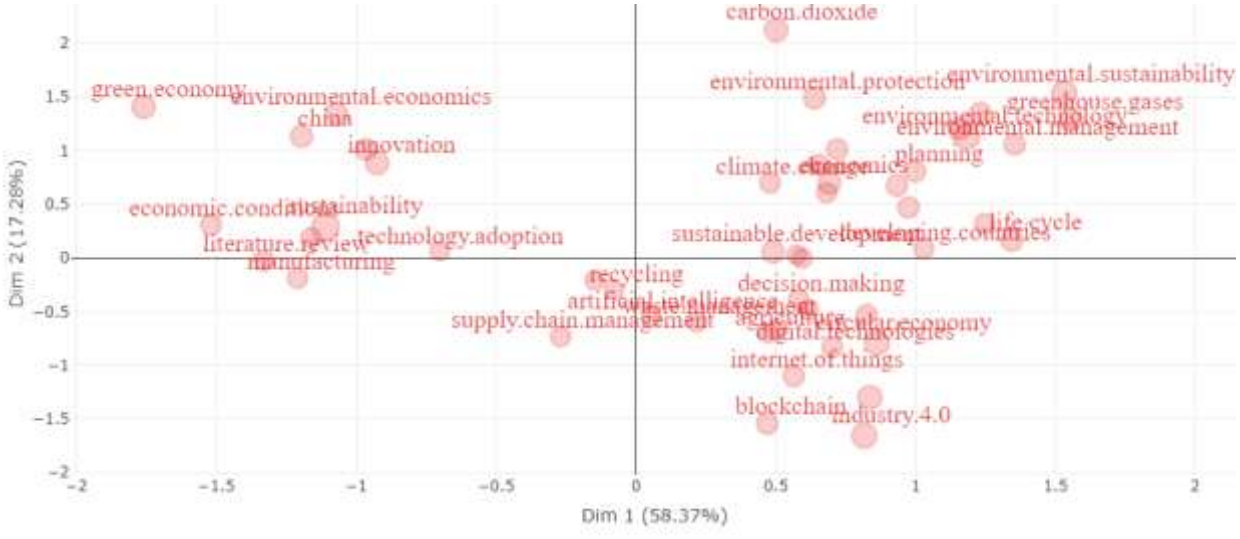

Figure 16. Factorial analysis

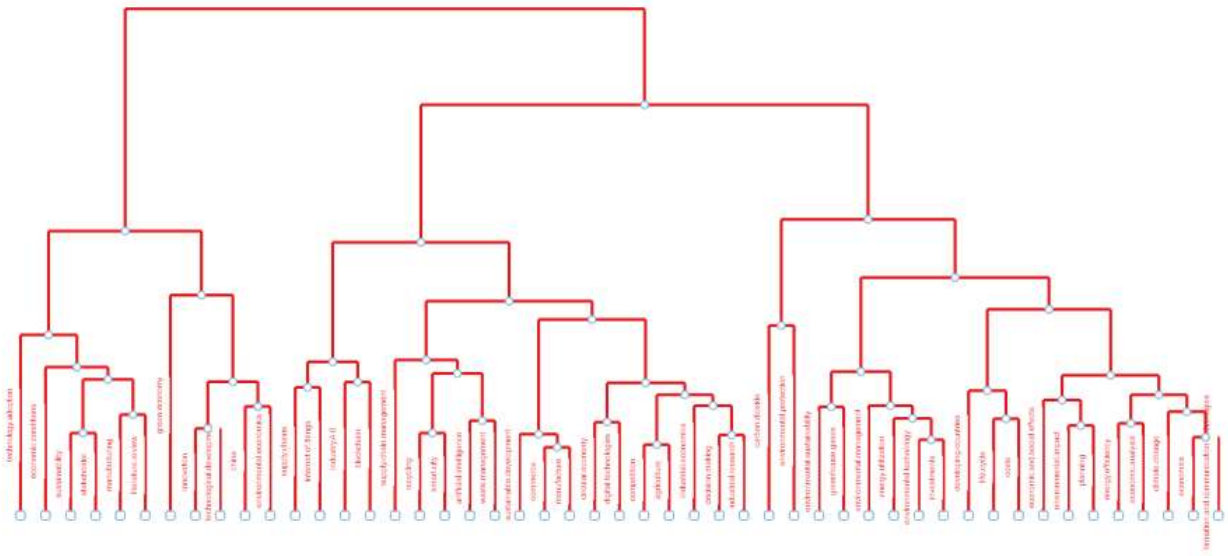

Figure 17. Show factorial analysis.

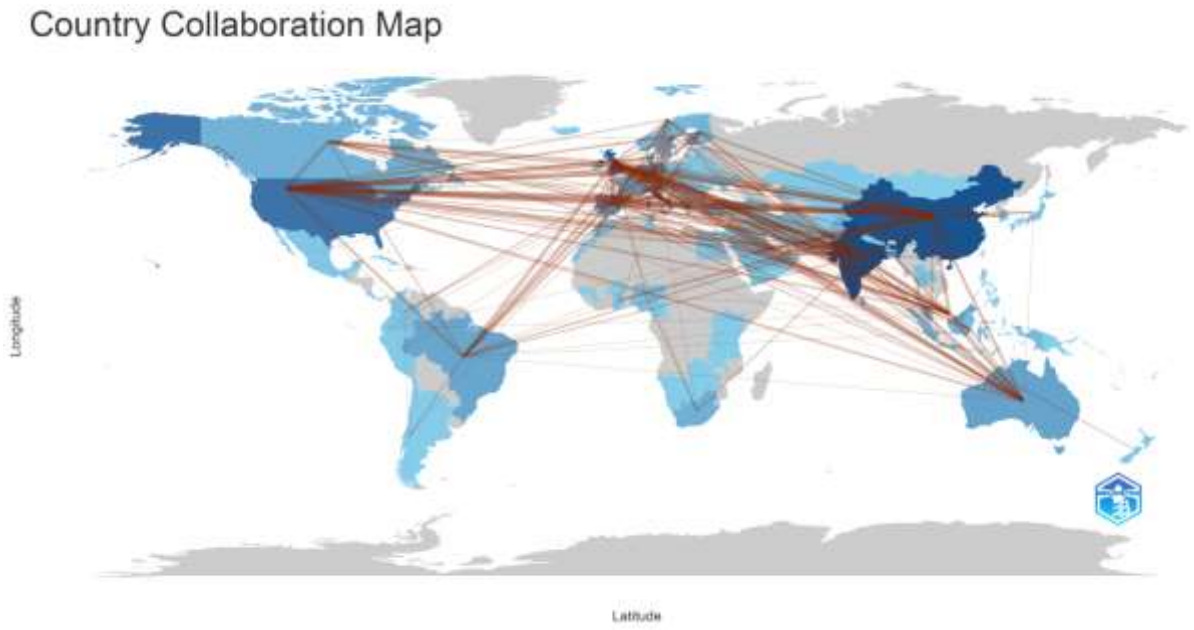

Figure 18. Shows the country collaboration map

5. CONCLUSION

The conclusion that "Artificial Intelligence enhances the economy" is supported by a growing body of evidence and research showcasing the transformative impact of AI technologies on economic growth, innovation, and various industries. This conclusion reflects the consensus that AI has become a pivotal driver of change and progress in the modern economic landscape. AI technologies contribute to economic growth by fostering efficiency, productivity, and competitiveness. The automation of tasks, data-driven insights, and innovative solutions lead to improved economic outcomes. Industries across sectors, including manufacturing, healthcare, finance, and agriculture, are experiencing transformative changes due to AI's ability to optimize processes, enhance decision-making, and introduce new business models. While acknowledging the benefits of AI in enhancing the economy, it's important to consider challenges associated with ethics, transparency, data privacy, and equitable access to AI technologies. Striking a balance between innovation and responsible implementation is essential for maximizing the positive impact of AI on economies and societies. Nations that invest in AI research and adoption position themselves as

leaders in the global economy, attracting investments and fostering a culture of innovation. In conclusion, the integration of Artificial Intelligence into various economic facets is driving positive change, fostering innovation, and contributing to the sustained growth of economies worldwide. This article also covered the research questions such as factors that enhance the economy. These are the factors that affect the economy, artificial intelligence, supply chain management, climate change, recycling, waste management, smart city, carbon dioxide, environmental protection, public policy, and emission control.

Based on the findings, China emerges as the foremost nation with a total of 195 publications. India ranks second in terms of the number of publications, with a total of 137. In a similar vein, the United Kingdom emerges as a prominent nation, with a total of 120 publications. The term "Industry 4.0" emerges as a prominent keyword in co-keyword analysis, appearing 363 times and exhibiting total link strength of 331. The most frequently used term is "sustainable development," which appears 791 times and has total link strength of 5291. The second most often used term is "innovation," which appears 167 times and has total link strength of 1005. Similarly, the third keyword is "economics," which occurs 160 times and has total link strength of 1164. This study provides empirical evidence of the diverse ways in which AI is empirically shown to enhance economies. The evidence underscores the potential of AI technologies to drive growth, create jobs, and catalyze innovation across multiple sectors, contributing to the overall advancement of economies worldwide.

REFERENCES

[1] Alavi, B., Tavana, M., & Mina, H. (2021). A Dynamic Decision Support System for Sustainable Supplier Selection in Circular Economy. Sustainable Production and Consumption, 27, 905–920. https://doi.org/10.1016/j.spc.2021.02.015

[2] Aldasoro, U., Merino, M., & Pérez, G. (2019). Time consistent expected mean-variance in multistage stochastic quadratic optimization: a model and a matheuristic. Annals of Operations Research, 280(1–2), 151–187. https://doi.org/10.1007/s10479-018-3032-7

[3] Alexander Douglas, D., & Yvonne Coleman, S. (2013). Statistical thinking in the quality movement 25 years. The TQM Journal, 25(6), 597–605. https://doi.org/10.1108/TQM-06-2013-0075

[4] Aloini, D., Dulmin, R., Mininno, V., Pellegrini, L., & Farina, G. (2018). Technology assessment with IF-TOPSIS: An application in the advanced underwater system sector. Technological Forecasting and Social Change, 131, 38–48. https://doi.org/10.1016/j.techfore.2017.07.010

[5] Ammar, M., Russello, G., & Crispo, B. (2018). Internet of Things: A survey on the security of IoT frameworks. Journal of Information Security and Applications, 38, 8–27. https://doi.org/10.1016/j.jisa.2017.11.002

[6] Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. Journal of Informetrics, 11(4), 959–975. https://doi.org/10.1016/j.joi.2017.08.007

[7] Awan, U., Kanwal, N., Alawi, S., Huiskonen, J., & Dahanayake, A. (2021). Artificial Intelligence for Supply Chain Success in the Era of Data Analytics (pp. 3–21). https://doi.org/10.1007/978-3-030-62796-6_1

[8] Balugani, E., Lolli, F., Gamberini, R., Rimini, B., & Babai, M. Z. (2019). A periodic inventory system of intermittent demand items with fixed lifetimes. International Journal of Production Research, 57(22), 6993–7005. https://doi.org/10.1080/00207543.2019.1572935

[9] Balugani, E., Lolli, F., Gamberini, R., Rimini, B., & Regattieri, A. (2018). Clustering for inventory control systems. IFAC-PapersOnLine, 51(11), 1174–1179. https://doi.org/10.1016/j.ifacol.2018.08.431

[10] Biesenthal, C., & Wilden, R. (2014). Multi-level project governance: Trends and opportunities. International Journal of Project Management, 32(8), 1291–1308. https://doi.org/10.1016/j.ijproman.2014.06.005

[11] Bonilla, C. A., Merigó, J. M., & Torres-Abad, C. (2015). Economics in Latin America: a bibliometric analysis. Scientometrics, 105(2), 1239–1252. https://doi.org/10.1007/s11192-015-1747-7

[12] Breja, S. K., Banwet, D. K., & Iyer, K. C. (2011). Quality strategy for transformation: a case study. The TQM Journal, 23(1), 5–20. https://doi.org/10.1108/17542731111097452

[13] Chávez, J. A. M.-., Arroyo, N. S. M. ., María, S. A. F. de ., Saravia, R. C. ., Hinostroza, M. R. D. ., Montenegro, L. P. B. ., Toledo, M. F. M. ., Olivares, J. A. C. ., & Puga, N. B. . (2023). Artificial Intelligence in Engineering and Computer Science Learning: Systematic Review Article. International Journal of Membrane Science and Technology, 10(3), 221-233. https://doi.org/10.15379/ijmst.v10i3.1514

[14] Brown, A. (2013). Quality: where have we come from and what can we expect? The TQM Journal, 25(6), 585–596. https://doi.org/10.1108/TQM-04-2013-0045

[15] Chaouch, B. A. (2018). Analysis of the stochastic cash balance problem using a level crossing technique. Annals of Operations Research, 271(2), 429–444. https://doi.org/10.1007/s10479-018-2822-2

[16] Chen, C. (2006). CiteSpace II: Detecting and visualizing emerging trends and transient patterns in scientific literature. Journal of the American Society for Information Science and Technology, 57(3), 359–377. https://doi.org/10.1002/asi.20317

[17] Choi, Y., Lee, H., & Irani, Z. (2018). Big data-driven fuzzy cognitive map for prioritising IT service procurement in the public sector. Annals of Operations Research, 270(1–2), 75–104. https://doi.org/10.1007/s10479-016-2281-6

[18] Chung, C. H. (2018). The Kaizen Wheel – an integrated philosophical foundation for total continuous improvement. The TQM Journal, 30(4),

409–424. https://doi.org/10.1108/TQM-03-2018-0029

[19] Cobo, M. J., López-Herrera, A. G., Herrera-Viedma, E., & Herrera, F. (2011). Science mapping software tools: Review, analysis, and cooperative study among tools. Journal of the American Society for Information Science and Technology, 62(7), 1382–1402. https://doi.org/10.1002/asi.21525

[20] Colicchia, C., Creazza, A., & Menachof, D. A. (2019). Managing cyber and information risks in supply chains: insights from an exploratory analysis. Supply Chain Management: An International Journal, 24(2), 215–240. https://doi.org/10.1108/SCM-09-2017-0289

[21] Deshpande, P., Sharma, S. C., Peddoju, S. K., & Abraham, A. (2018). Security and service assurance issues in Cloud environment. International Journal of System Assurance Engineering and Management, 9(1), 194–207. https://doi.org/10.1007/s13198-016-0525-0

[22] Dolgui, A., Ivanov, D., & Sokolov, B. (2018). Ripple effect in the supply chain: an analysis and recent literature. International Journal of Production Research, 56(1–2), 414–430. https://doi.org/10.1080/00207543.2017.1387680

[23] HAMID, M., Jam, F.A., Mehmood, S. (2019). Psychological Empowerment and Employee Attitudes: Mediating Role of Intrinsic Motivation. International Journal of Business and Economic Affairs, 4(6), 300-314.

[24] Donthu, N., Reinartz, W., Kumar, S., & Pattnaik, D. (2021). A retrospective review of the first 35 years of the International Journal of Research in Marketing. International Journal of Research in Marketing, 38(1), 232–269. https://doi.org/10.1016/j.ijresmar.2020.10.006

[25] Dupont, L., Bernard, C., Hamdi, F., & Masmoudi, F. (2018). Supplier selection under risk of delivery failure: a decision-support model considering managers' risk sensitivity. International Journal of Production Research, 56(3), 1054–1069. https://doi.org/10.1080/00207543.2017.1364442

[26] Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. Journal of Advanced Nursing, 62(1), 107–115. https://doi.org/10.1111/j.1365-2648.2007.04569.x

[27] Fatorachian, H., & Kazemi, H. (2018). A critical investigation of Industry 4.0 in manufacturing: theoretical operationalisation framework. Production Planning & Control, 29(8), 633–644. https://doi.org/10.1080/09537287.2018.1424960

[28] Felfel, H., Yahia, W. Ben, Ayadi, O., & Masmoudi, F. (2018). Stochastic multi-site supply chain planning in textile and apparel industry under demand and price uncertainties with risk aversion. Annals of Operations Research, 271(2), 551–574. https://doi.org/10.1007/s10479-018-2980-2

[29] Fink, A. (2019). Conducting research literature reviews : from the internet to paper. Upplaga 5. Los Angeles; University of California S. 26. 304. https://books.google.ch/books?id=Dg5zAwAAQBAJ&printsec=frontcover&dq=A.+Fink+Conducting+research+literature+reviews:+From+the+Internet+to+paper&hl=de&sa=X&redir_esc=y#v=onepage&q=A. Fink Conducting research literature reviews%3A From the Internet to paper

[30] Ghisellini, P., Cialani, C., & Ulgiati, S. (2016). A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems. Journal of Cleaner Production, 114, 11–32. https://doi.org/10.1016/j.jclepro.2015.09.007

[31] Ghoreishi, M., & Happonen, A. (2020). New promises AI brings into circular economy accelerated product design: a review on supporting literature. E3S Web of Conferences, 158, 06002. https://doi.org/10.1051/e3sconf/202015806002

[32] Guo, Y. M., Huang, Z. L., Guo, J., Li, H., Guo, X. R., & Nkeli, M. J. (2019). Bibliometric analysis on smart cities research. Sustainability (Switzerland), 11(13), 3606. https://doi.org/10.3390/su11133606

[33] Håkansson, H., & Persson, G. (2004). Supply Chain Management: The Logic of Supply Chains and Networks. The International Journal of Logistics Management, 15(1), 11–26. https://doi.org/10.1108/09574090410700202

[34] He, B., & Yang, Y. (2018). Mitigating supply risk: an approach with quantity flexibility procurement. Annals of Operations Research, 271(2), 599–617. https://doi.org/10.1007/s10479-018-2840-0

[35] Hirsch, J. E. (2005). An index to quantify an individual's scientific research output. Proceedings of the National Academy of Sciences of the United States of America, 102(46), 16569–16572. https://doi.org/10.1073/pnas.0507655102

[36] Joshi, S., Saxena, S., Godbole, T., & Shreya. (2016). Developing Smart Cities: An Integrated Framework. Procedia Computer Science, 93, 902–909. https://doi.org/10.1016/j.procs.2016.07.258

[37] Karapetrovic, S. (2010). Special issue of the TQM Journal: "Integrated Management Systems". The TQM Journal, 22(6). https://doi.org/10.1108/tqm.2010.10622faa.001

[38] Khayyam, H., Naebe, M., Milani, A. S., Fakhrhoseini, S. M., Date, A., Shabani, B., Atkiss, S., Ramakrishna, S., Fox, B., & Jazar, R. N. (2021). Improving energy efficiency of carbon fiber manufacturing through waste heat recovery: A circular economy approach with machine learning. Energy, 225, 120113. https://doi.org/10.1016/j.energy.2021.120113

[39] Kumar, R., Singh, K., & Jain, S. K. (2019). Development of a framework for agile manufacturing. World Journal of Science, Technology and Sustainable Development, 16(4), 161–169. https://doi.org/10.1108/WJSTSD-05-2019-0022

[40] Liu, W., Wang, S., Zhu, D., Wang, D., & Shen, X. (2018). Order allocation of logistics service supply chain with fairness concern and demand updating: model analysis and empirical examination. Annals of Operations Research, 268(1–2), 177–213. https://doi.org/10.1007/s10479-017-2482-7

[41] Lopes de Sousa Jabbour, A. B., Jabbour, C. J. C., Godinho Filho, M., & Roubaud, D. (2018). Industry 4.0 and the circular economy: a proposed research agenda and original roadmap for sustainable operations. Annals of Operations Research, 270(1–2), 273–286. https://doi.org/10.1007/s10479-018-2772-8

[42] Massaro, M., Dumay, J., & Guthrie, J. (2016). On the shoulders of giants: undertaking a structured literature review in accounting. Accounting, Auditing and Accountability Journal, 29(5), 767–801. https://doi.org/10.1108/AAAJ-01-2015-1939

[43] Mhlanga, D. (2021). Artificial Intelligence in the Industry 4.0, and Its Impact on Poverty, Innovation, Infrastructure Development, and the Sustainable Development Goals: Lessons from Emerging Economies? Sustainability, 13(11), 5788. https://doi.org/10.3390/su13115788

[44] Mishra, D., Gunasekaran, A., Papadopoulos, T., & Childe, S. J. (2018). Big Data and supply chain management: a review and bibliometric analysis. Annals of Operations Research, 270(1–2), 313–336. https://doi.org/10.1007/s10479-016-2236-y

[45] Mishra, D., Sharma, R. R. K., Gunasekaran, A., Papadopoulos, T., & Dubey, R. (2019). Role of decoupling point in examining manufacturing flexibility: an empirical study for different business strategies. Total Quality Management & Business Excellence, 30(9–10), 1126–1150. https://doi.org/10.1080/14783363.2017.1359527

[46] Mukrimaa, S. S., Nurdyansyah, Fahyuni, E. F., YULIA CITRA, A., Schulz, N. D., غاسان, د., Taniredja, T., Faridli, E. M., & Harmianto, S. (2016). Artificial intelligence and Internet of Things enabled circular economy. Jurnal Penelitian Pendidikan Guru Sekolah Dasar, 6(August), 128. https://doi.org/10.9790/1813-0709035563

[47] Nañez Alonso, S. L., Reier Forradellas, R. F., Pi Morell, O., & Jorge-Vazquez, J. (2021). Digitalization, Circular Economy and Environmental Sustainability: The Application of Artificial Intelligence in the Efficient Self-Management of Waste. Sustainability, 13(4), 2092. https://doi.org/10.3390/su13042092

[48] Nebl, T., & Schroeder, A. (2011). Understanding the interdependencies of quality problems and productivity. The TQM Journal, 23(5), 480–495. https://doi.org/10.1108/17542731111157590

[49] Nie, D., Qu, T., Liu, Y., Li, C., & Huang, G. Q. (2019). Improved augmented Lagrangian coordination for optimizing supply chain configuration with multiple sharing elements in industrial cluster. Industrial Management & Data Systems, 119(4), 743–773. https://doi.org/10.1108/IMDS-06-2018-0253

[50] Ogunmakinde, O. E., Egbelakin, T., & Sher, W. (2022). Contributions of the circular economy to the UN sustainable development goals through sustainable construction. Resources, Conservation and Recycling, 178, 106023. https://doi.org/10.1016/j.resconrec.2021.106023

[51] Pei, J., Liu, X., Fan, W., Pardalos, P. M., & Lu, S. (2019). A hybrid BA-VNS algorithm for coordinated serial-batching scheduling with deteriorating jobs, financial budget, and resource constraint in multiple manufacturers. Omega, 82, 55–69. https://doi.org/10.1016/j.omega.2017.12.003

[52] Petridis, K., & Dey, P. K. (2018). Measuring incineration plants' performance using combined data envelopment analysis, goal programming and mixed integer linear programming. Annals of Operations Research, 267(1–2), 467–491. https://doi.org/10.1007/s10479-018-2809-z

[53] Płoszaj-Mazurek, M., Ryńska, E., & Grochulska-Salak, M. (2020). Methods to optimize carbon footprint of buildings in regenerative architectural design with the use of machine learning, convolutional neural network, and parametric design. Energies, 13(20). https://doi.org/10.3390/en13205289

[54] Popp, D. (2006). R&D Subsidies and Climate Policy: Is There a "Free Lunch"? Climatic Change, 77(3–4), 311–341. https://doi.org/10.1007/s10584-006-9056-z

[55] Porselvi, S., Balaji, A. N., & Jawahar, N. (2018). Artificial immune system and particle swarm optimisation algorithms for an integrated production and distribution scheduling problem. International Journal of Logistics Systems and Management, 30(1), 31. https://doi.org/10.1504/IJLSM.2018.091451

[56] Prajogo, D., Toy, J., Bhattacharya, A., Oke, A., & Cheng, T. C. E. (2018). The relationships between information management, process management and operational performance: Internal and external contexts. International Journal of Production Economics, 199, 95–103. https://doi.org/10.1016/j.ijpe.2018.02.019

[57] Rajput, S., & Singh, S. P. (2021). Industry 4.0 − challenges to implement circular economy. Benchmarking: An International Journal, 28(5), 1717–1739. https://doi.org/10.1108/BIJ-12-2018-0430

[58] Rakhshan, V. (2018). Common risk factors of dry socket (alveolitis osteitis) following dental extraction: A brief narrative review. Journal of Stomatology, Oral and Maxillofacial Surgery, 119(5), 407–411. https://doi.org/10.1016/j.jormas.2018.04.011

[59] Rathinamoorthy, R. (2019). Circular fashion. In Circular Economy in Textiles and Apparel (pp. 13–48). Elsevier. https://doi.org/10.1016/B978-0-08-102630-4.00002-9

[60] Ray, P. P. (2018). A survey on Internet of Things architectures. Journal of King Saud University - Computer and Information Sciences, 30(3), 291–319. https://doi.org/10.1016/j.jksuci.2016.10.003

[61] Razzaq, A., Sharif, A., Najmi, A., Tseng, M.-L., & Lim, M. K. (2021). Dynamic and causality interrelationships from municipal solid waste recycling to economic growth, carbon emissions and energy efficiency using a novel bootstrapping autoregressive distributed lag. Resources, Conservation and Recycling, 166, 105372. https://doi.org/10.1016/j.resconrec.2020.105372

[62] Ren, S., Zhang, Y., Liu, Y., Sakao, T., Huisingh, D., & Almeida, C. M. V. B. (2019). A comprehensive review of big data analytics throughout product lifecycle to support sustainable smart manufacturing: A framework, challenges and future research directions. Journal of Cleaner Production, 210, 1343–1365. https://doi.org/10.1016/j.jclepro.2018.11.025

[63] Sarker, I. H. (2021). Machine Learning: Algorithms, Real-World Applications and Research Directions. SN Computer Science, 2(3), 160. https://doi.org/10.1007/s42979-021-00592-x

[64] Schlüter, M., Lickert, H., Schweitzer, K., Bilge, P., Briese, C., Dietrich, F., & Krüger, J. (2021). AI-enhanced Identification, Inspection and Sorting for Reverse Logistics in Remanufacturing. Procedia CIRP, 98, 300–305. https://doi.org/10.1016/j.procir.2021.01.107

[65] Shibin, K. T., Dubey, R., Gunasekaran, A., Luo, Z., Papadopoulos, T., & Roubaud, D. (2018). Frugal innovation for supply chain sustainability in SMEs: multi-method research design. Production Planning & Control, 29(11), 908–927. https://doi.org/10.1080/09537287.2018.1493139

[66] Small, H. (1973). Co-citation in the scientific literature: A new measure of the relationship between two documents. Journal of the American Society for Information Science, 24(4), 265–269. https://doi.org/10.1002/asi.4630240406

[67] Small, H., & Garfield, E. (1985). The geography of science: disciplinary and national mappings. Journal of Information Science, 11(4), 147–159. https://doi.org/10.1177/016555158501100402

[68] Stock, T., & Seliger, G. (2016). Opportunities of Sustainable Manufacturing in Industry 4.0. Procedia CIRP, 40, 536–541. https://doi.org/10.1016/j.procir.2016.01.129

[69] Tang, M., & Liao, H. (2021). Multi-attribute large-scale group decision making with data mining and subgroup leaders: An application to the development of the circular economy. Technological Forecasting and Social Change, 167, 120719. https://doi.org/10.1016/j.techfore.2021.120719

[70] Wang, D., & Zhang, Y. (2020). RETRACTED ARTICLE: Implications for sustainability in supply chain management and the circular economy using machine learning model. Information Systems and E-Business Management. https://doi.org/10.1007/s10257-020-00477-1

DOI: https://doi.org/10.15379/ijmst.v10i3.1756