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Article

EU International Business Development and Sustainability

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ABSTRACT

Background: The global demand for climate-based sustainable development highlights issues of social justice and resource scarcity, positioning Multinational corporations (MNEs) as key players. Their economic, environmental, and social impacts underscore the need for robust sustainability measures. This paper explores MNE development and its role in achieving sustainable development goals, specifically focusing on industry, innovation, and infrastructure (SDG 9).

Methods: The author employs an exploratory research method using STATISTA data on revenue and employee numbers for the top 100 European companies (2020–2022), focusing only on EU-based MNEs. Additionally, covariance analysis and the Spearman correlation method are used to examine the relationship between MNE indicators and SDG 9.

Results: This study suggests looking at MNEs as the players that leverage sustainability initiatives. The authors performed several studies. The bibliometric analysis results show that seven clusters have been created to summarize prevalent topics on MNE topics. Only one is related to sustainable development, strategies for multinational corporate groups, and global sustainable development goals. Further, the authors investigated relationships between MNE and one of the sustainable development goals (SDG 9). By forming a correlation matrix, the authors identified the existence of the middle-strength relationships. The authors identified that the highest correlation coefficient exists between SDG 9 and several domains operated by MNE.

Conclusions: To ensure sustainable growth, multinational corporations must meet their targets, aligning their contributions with the United Nations Sustainable Development Goals and supporting long-term sustainability initiatives.

KEYWORDS: international business; multinational corporations; sustainability; SDG; revenue; bibliometric analysis

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INTRODUCTION

The importance of sustainability is growing worldwide, especially in the face of climate change, social inequalities, and dwindling natural resources. Multinational companies operating in different parts of the world significantly impact the economy, the environment, and society. This makes their commitment to sustainability particularly important. The sustainability synthesis in multinational enterprises requires an integrated approach covering all aspects of operations.

For European companies, venturing beyond national borders isn't just an option; it's necessary for growth and prosperity (Bradley et al. [1]). Here's why international business is the lifeblood of the European economy. The EU negotiates trade deals with countries worldwide, lowering trade barriers and creating a more favorable environment for European businesses to compete internationally. Also, the expansion of international business creates job opportunities.

A comprehensive systematization of literature is necessary to understand MNEs' roles, challenges, and motivations in pursuing SDGs. MNEs operate within a network of institutions, indirectly affecting their ability to address issues like poverty. Ultimately, MNEs must transcend profit motives to contribute to sustainable development (Celone et al. [2]). The response of MNE to long-term sustainable initiatives still has to be examined to understand what effect the operations of MNE in reaching SDG, particularly in light of the UN's 2030 Agenda for Sustainable Development. Sustainable Development Goal 9 Industry, particularly in Innovation and Infrastructure (SDG 9), is used to describe resilient infrastructure, promote inclusive and sustainable industrialization, and promote innovation.

The paper consists of 5 sections. The first section (INTRODUCTION) highlights the development of MNE and focuses on the bibliometric study of multinationals and sustainability. Herein the authors present the sustainability aspects of MNE operations. It also revises the synthesis on MNE and sustainability, particularly SDG 9. The second section (MATERIALS AND METHODS) presents materials and methods. The third section (RESULTS) presents the results of empirical research. Finally, in the last two sections (DISCUSSION, CONCLUSIONS) authors provided discussion and conclusion.

The Importance of International Business Companies in Europe and Globally

International business has become a cornerstone of economic development and globalization, significantly impacting Europe and the global economy. The interconnection of markets, the flow of goods and services across borders, and the movement of capital and labor are critical components driving economic growth, innovation, and cultural exchange (Shenkar et al. [3]). This review highlights the importance of international

business, emphasizing its role in Europe and its global significance, supported by insights from published articles.

According to Rugman and Verbeke [4], multinational enterprises (MNEs) play a crucial role in the global economy by transferring knowledge and technology across borders, thus fostering economic development in home and host countries.

In Europe, the integration of markets through the European Union (EU) has been a significant catalyst for economic growth. The single market allows for the free movement of goods, services, capital, and people, leading to increased trade and investment. The European Commission [5] highlights that the EU's single market contributes to higher GDP and employment levels across member states by providing businesses access to a larger customer base and more resources.

Many of the world's largest companies by revenue hail from Europe. Volkswagen Group, Mercedes-Benz Group, BMV, Deutsche Telekom, Allianz, and others from Germany, Stellantis (Netherlands), Novartis (Switzerland), Carrefour, Total energies, Lvmh Moet Hennessy-Louis (France), Repsol (Spain), Anheuser-Busch InBev (Belgium), Omv (Austria), etc.

These companies leverage their international presence to maximize economies of scale and tap into diverse talent pools. These companies' success hinges on their ability to cater to international tastes and preferences and dominate the global market.

This article analyzed Statista data (Statista [6]) on the top 100 largest European companies. The authors narrowed the data by choosing 61 companies (Appendix: Table A1) that belong to the European Union. There is 1 in Austria, 2 in Belgium, 2 in Denmark, 16 in France, 23 in Germany, 2 in Ireland, 1 in Italy, 6 in the Netherlands, 1 in Poland, 5 in Spain, 2 in Sweden. After adding up the income of each participating company for the respective year, the results shown in Table 1 are obtained.

Table 1. European Union countries in which business enterprises generated the highest revenue in 2020–2022.

Headquarters	Revenue (in million USD)			Aggregated revenue (in million USD)
	2020	2021	2022	2020–2022
Austria	18,883	42,076	69,681	130,640
Belgium	70,607	82,958	86,236	239,801
Denmark	57,751	90,950	117,530	266,231
France	773,309	972,210	1,219,109	2,964,628
Germany	1,524,073	1,930,680	2,239,376	5,694,129
Ireland	74,444	82,219	93,280	249,943
Italy	51,282	92,034	149,530	292,846
Netherlands	376,785	442,564	471,923	1,291,272
Poland	22,099	34,013	66,922	123,034
Spain	166,122	214,636	268,649	649,407
Sweden	53,850	70,523	79,459	203,832

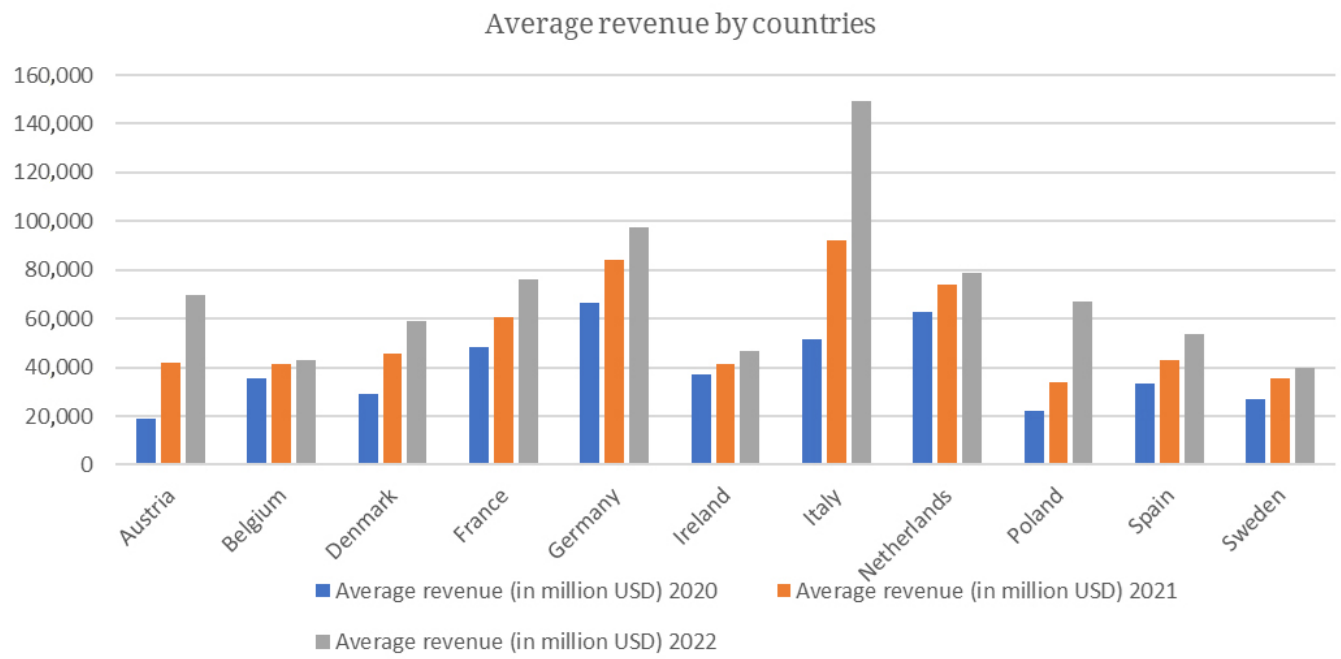

Figure 1. The average revenue by countries in million USD 2020–2022.

Analysing Figure 1, we can see:

- Italy shows the most significant increase in revenue, particularly between 2020 and 2021, with an extraordinary rise from $51,282 million to $150 million in 2022.
- Consistent performers are Germany, France, and the Netherlands, which have high average revenues and steady growth patterns.
- Emerging trends and remarkable growth are shown in countries like Poland and Austria.
- Belgium, Ireland, and Sweden exhibit moderate growth, reflecting stable but less aggressive expansion compared to others.

Figure 1 highlights the robust growth of average revenues across various European headquarters from 2020 to 2022, with Italy and Austria experiencing the most significant increases. Consistently high performers include Germany, France, and the Netherlands, while countries like Belgium and Ireland show moderate growth. The general trend across most countries is positive, with increasing average revenues indicating overall economic growth and resilience within the EU.

Employment indicators in the MNE of EU countries

International business fosters cultural exchange and global integration by connecting people from diverse backgrounds. This interaction enhances mutual understanding and promotes cultural diversity, which is vital in today's interconnected world (Duffy et al. [7]). As described by

Aharoni [8], globalization, driven by international business, has made the world “flat”, breaking down cultural and economic barriers.

The expansion of international business creates job opportunities and fosters skill development. Multinational companies often bring high-quality jobs to host countries, contributing to the local economy and improving living standards. According to a study by the OECD [9], international business activities are associated with higher wages and better working conditions than domestic firms.

In Europe, the influx of foreign direct investment (FDI) has been instrumental in creating jobs and enhancing workforce skills. European Union countries like Germany, France, Denmark, Sweden, Spain, and others attract significant FDI, leading to new industries and the upskilling of local labor. Such actions have to be linked with SDG 9’s direction. This trend boosts employment and equips the workforce with the skills needed to thrive in a globalized economy (Dempere et al. [10]).

Analyzing the collected data about the top European Union companies, it was determined how much, on average, employees generated revenue for the company in 2020–2022 (Table 2).

Table 2. Revenue generated per employee by MNE according to host country.

Host country	Number of Employees	Revenue in USD/per Employee
Austria	22,308	5.856
Belgium	180,861	1.326
Denmark	180,543	1.475
France	2,242,801	1.322
Germany	3,628,926	1.569
Ireland	816,000	0.306
Italy	32,188	9.098
Netherlands	1,233,200	1.047
Poland	64,494	1.908
Spain	333,648	1.946
Sweden	207,684	0.981

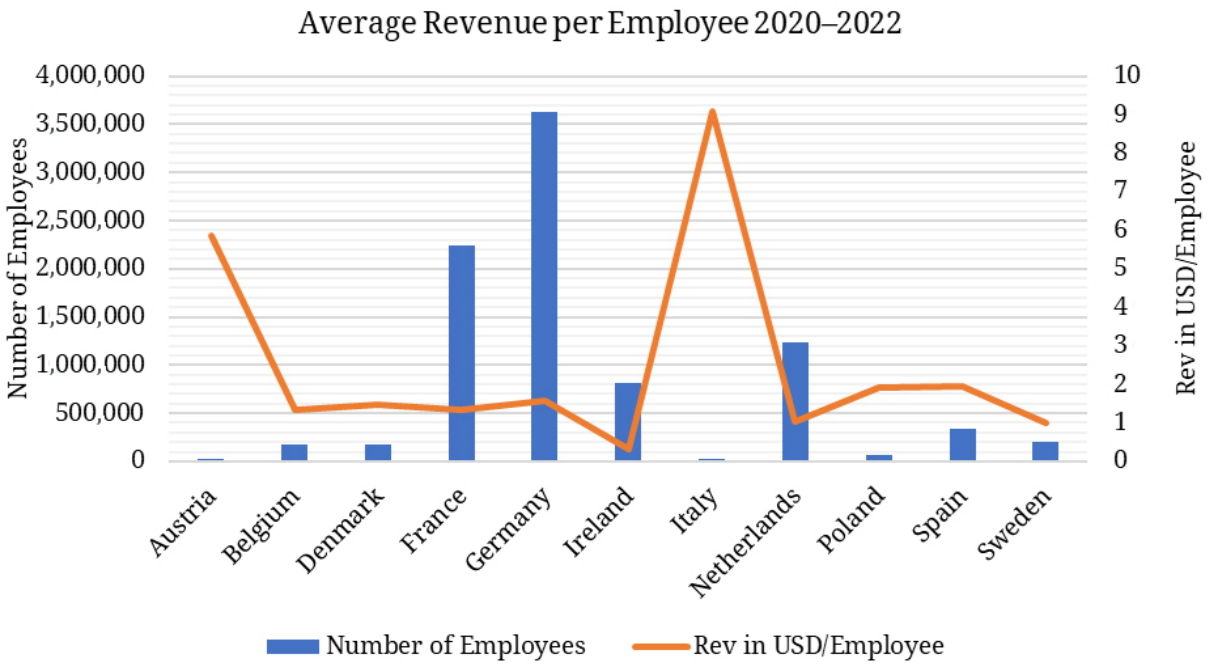

Figure 2. Average Revenue per Employee 2020–2022.

Average Revenue per Employee 2020–2022 (Figure 2):

- Italy has the highest revenue per employee at 9.098 but the smallest workforce in the table with 32,188 employees. High revenue per employee coupled with a relatively small workforce might indicate a high efficiency in the specialized refined petroleum industry, and it is the only company represented in the county.
- Ireland has a large workforce indicator—816,000 employees—despite the low revenue per employee at 0.306 rate.
- Sweden and Ireland have significantly lower revenue per employee compared to other countries. Sweden, with low revenue per employee, might be facing challenges in productivity or could be in industries with lower revenue generation per employee.
- Austria stands out with a relatively high revenue per employee at 5.856.
- Germany has the largest number of employees at 3,628,926, which is one of the 23 biggest companies in the country and the biggest industrial base.
- France follows with 2,242,801 employees, as well as following with 16 companies in the country with the heist revenues.

Bibliometric Study of Multinational Corporations and Sustainability

The authors conducted a bibliometric study and identified studies related to the MNE topic. During the construction of bibliometric maps, the following methodological guidelines were followed:

- The VOS viewer software is used to analyze articles included in the OpenAlex (The Open Directory to the Global Research System) database for the period 1970–2023;
- Analysis of bibliographic references helps identify related words and groups;
- The map was established based on peer-reviewed studies based on the coexistence of nouns mentioned in scientific paper's titles.

After searching for articles published on MNE topics, the authors created bibliographic maps and clusters.

VOS viewer uses VOC mapping technology that looks for "matches". Lewis et al. [11] discussed this mapping technique in detail. By default, the VOS viewer connects nodes to cluster networks. A cluster is a group of nodes that are closely connected to it. All nodes in the network are directly connected to the cluster. The separate parameter determines the number of clusters. The higher the value of this parameter, the greater the number of clusters. In bibliometric network visualization, the VOS viewer uses colors to represent the cluster to which the node is connected. Waltman, Van Eck, and Noyons [12] discuss the clustering technique of VOS viewers. This technology requires an intelligent algorithm, which Waltman and Van Eck [13] implemented.

The bibliographic graph (see Figure 3) uses paper with certain characteristics. First, the circles on the map have colors, show different clusters, and define closely related keywords. The lines on the map show the relationship between keywords and the strength of their links. The spacing between words indicates the strength of the connection.

The following are the results of bibliometric studies that present seven clusters that summarize the results of the words used in forming the clusters.

For presentation purposes, the authors obtained results only in specific sets. The keywords "multinational company", "MNE strategy", "sustainability", and "sustainable development goal" are in the first cluster and have 112, 51, 179, and 109 links, respectively. For example, "MNE performance" has 95 links in the second cluster. The third cluster, "MNE subsidiaries", has 154 links. The MNE subsidiary and "European MNE" in the fourth cluster have 115 and 66 links. In the sixth cluster, "MNE activity" and "large MNE" have 216 and 74 links, respectively.

The link between sustainability and MNE is evident in the first cluster.

Below are the results of the bibliometric analysis. The constructed groups of 4 keywords can be seen in Figure 3 and Tables 2 and 3, which summarize the results of keyword clustering.

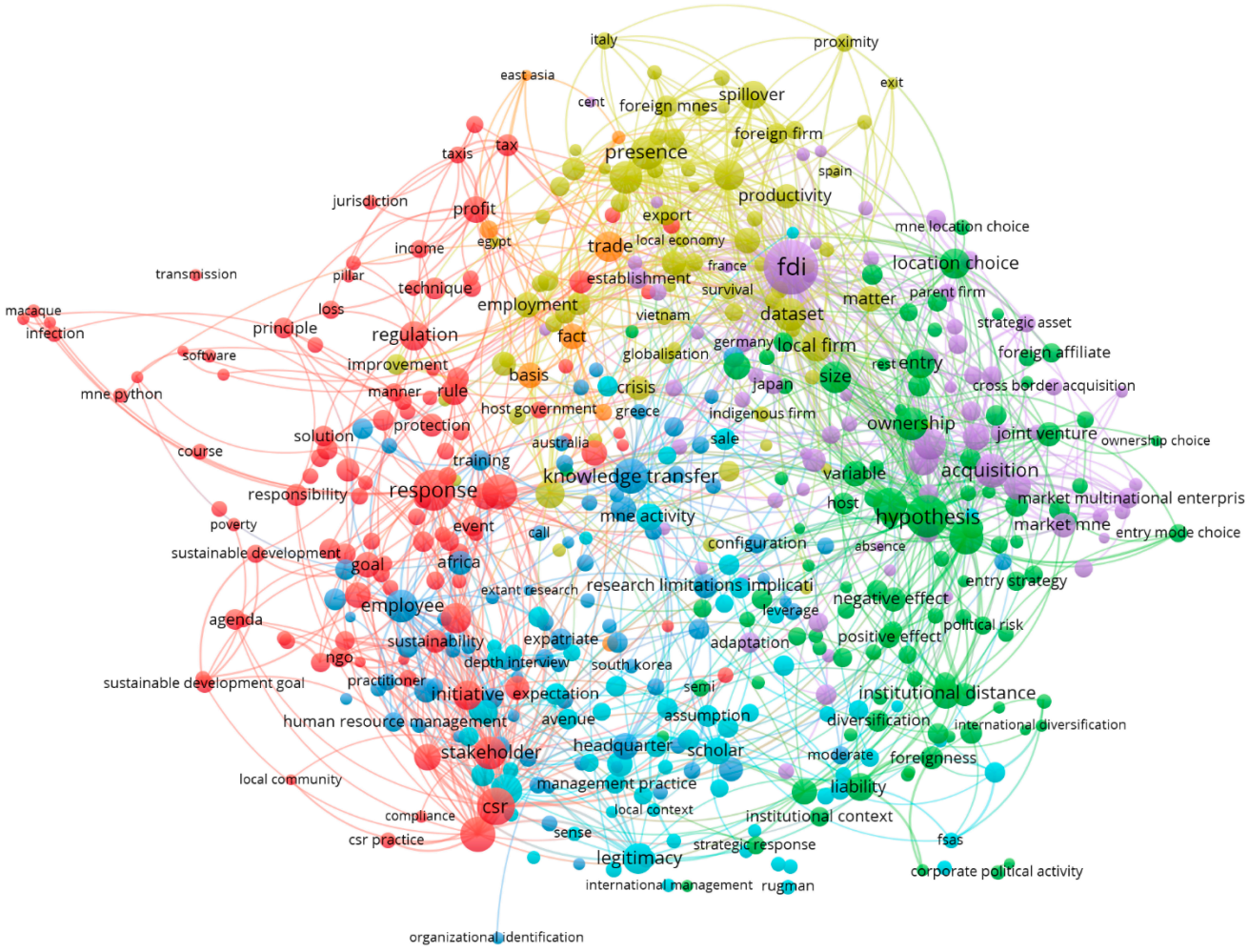

Figure 3. The map created under the word “MNE”.

A bibliometric analysis was collected from 3368 articles, and 510 keywords, which were divided into 7 clusters, were obtained and presented in Figure 3. Articles were selected from the Web of Science publications database whose keywords are “MNE”, “sustainability”, “sustainable development”, and “SDG”. The lines represent the connections between keywords. The strength of these connections indicates the number of publications where two keywords appeared together; thicker lines signify stronger connections. The size of each circle reflects the importance of the keywords. Circles with the same color indicate that the keywords belong to the same cluster (Table 3).

Table 3. The summary of prioritized criteria in scientific publications published during 1970–2023.

No. of cluster	Keywords	Number of Links	Occurrence	Strength of links
1	Stakeholder	308	74	719
	CSR	296	100	793
	Response	296	116	653
	Review	296	87	563
	Corporate social responsibility	284	90	727
2	Hypothesis	345	126	976
	Distance	297	84	745
	Choice	271	84	607
	Size	262	70	505
	Ownership	252	74	506
3	Employee	297	75	622
	Knowledge transfer	254	85	565
	Research limitations implication	251	41	442
	Headquarter	232	52	403
	Person	197	34	315
4	Dataset	295	74	651
	Creation	266	60	543
	Presence	262	81	648
	Linkage	255	78	614
	Local firm	225	66	485
5	FDI	389	209	1478
	Acquisition	291	79	649
	Asset	270	71	558
	Chinese MNES	214	66	497
	EMNES	214	50	420
6	Field	273	72	557
	Legitimacy	252	63	516
	Scholar	244	53	445
	Expectation	218	34	383
	MNE activity	216	50	337
7	Trade	248	65	517
	Fact	242	47	426
	Basis	186	47	307
	Economic growth	136	24	216
	Book	122	20	168

The study results suggest that the transition of multinational corporations to sustainable development has been studied in some content. The clusters do not name concrete SD goals and their links with MNE.

There is still a lack of research to fill it, especially when talking about other clusters that have no links with sustainability. During bibliometric analysis, we understood that the relationship between variables is pivotal. This distinction is particularly relevant in researching multinational enterprises (MNEs) and their contribution to Sustainable Development Goal 9 (SDG 9), which focuses on building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation.

In this paper, we plan to study the link between SDG 9 and MNE indicators.

Sustainability Aspects in MNE Operations

Table 4 identifies the economic, social, and environmental domains and their key areas of focus for multinational companies integrating sustainability into their operations (Nižetić et al. [14]; Jawahir & Bradley [15]; Hu & Zheng [16]). Economic sustainability is about a company's long-term profitability without sacrificing its focus on the environment (Kumar [17]). This is achieved by reducing waste, applying efficient production technologies, and introducing renewable energy sources (Ko et al. [18]). It is also important for multinational companies to ensure the sustainability of complex operations spanning many countries. Sustainability focuses on working with suppliers who can assess the sustainability of the MNE using sustainability criteria and supply chain transparency so that all stages from the value chain information are clear to consumers (Villena & Gioia [19]; Ebinger & Omondi [20]).

When assessing the social sustainability of MNEs, it is important to ensure that employees' welfare and social responsibility are taken into account by providing good working conditions and promoting employee diversity and inclusion. Implementing social initiatives through educational programs and social projects is also important.

Multinational companies strive for environmental sustainability by reducing their negative environmental impact through environmental policies, such as emission control systems, waste reduction and recycling programs (Bui et al. [21]), and conservation of natural resources (Hu & Zheng [16]). A key factor helping MNEs to achieve environmental sustainability is green innovation, which includes new green technologies that reduce the environmental impact of production and the development of sustainable products throughout their life cycle (Tronnebati & Jawab [22]).

Table 4. The impact of sustainability on the performance of MNE by sector.

Sustainability sector	Sustainability strand	Description	References
Economic	Efficient production technologies	Investing in new technologies that reduce energy consumption and pollution	[14,15,23,24]
	Renewable energy	Solar, wind, and other renewable energy sources are used instead of fossil fuels.	[14,16,17,25,26]
	Waste reduction	Recycling processes are introduced in production, and waste is reduced	[14,18,21]
	Evaluating sustainable supply chains against sustainability criteria	Working with suppliers who meet sustainability standards	[19,22,27,28]
	Supply chain transparency	Providing consumers with information on the stages of the supply chain	[19,20]
Social	Ensuring good working conditions for employees	A safe and healthy working environment, fair pay	[29,30]
	Promoting diversity and inclusion	Gender equality, racial diversity, and other aspects of inclusion	[28,31]
	Educational programs for the community	Supporting local schools and universities, providing scholarships	[28,32]
	Social projects for the community	Investment in infrastructure improvements, health care programs	
Environmental	Pollution reduction	Emission control systems, waste reduction, and recycling programs	[17,28,32]
	Conservation of natural resources	Responsible use of water, soil, and other natural resources	[28,29]
	Green innovation and technology	New technologies that reduce the environmental impact of production	[16,22]
	Product design	Developing products that are more sustainable throughout their life cycle	[22]

Challenges faced by MNEs in integrating sustainability principles into their areas of activity are high initial costs of investing in new technologies and processes, regulatory differences, as different countries have different environmental and social requirements, and cultural differences, where representatives of different countries may have different approaches to sustainability (de Oliveira et al. [33]).

However, it should be noted that integrating sustainability provides many opportunities for MNEs. MNEs pursuing sustainability can attract more consumers and investors, thus ensuring a competitive advantage. In the long term, sustainability practices can help reduce costs, provide MNEs with long-term profitability, and strengthen the MNE's image and reputation.

Synthesis of MNE and Sustainability

As emphasized in the 2030 Agenda for Sustainable Development, multinational enterprises (MNEs) are pivotal in steering the transition towards a more sustainable and equitable future. These entities exert considerable influence on waste management practices, possess extensive global resources, and implement corporate social responsibility (CSR) strategies worldwide. Their substantial economic power underscores their responsibility in achieving the Sustainable Development Goals (SDGs). Nonetheless, MNEs face criticism for their inconsistent sustainability efforts and unethical practices within their value chains (Celone et al. [2]). Authors (Munro and Arli [34]; Ivanaj et al. [35]; Van Zanten and Van Tulder [36]) have noted the crucial role of the private sector, especially multinational companies, in implementing the 17 SDGs. Helping businesses implement the SDGs, 169 targets have also been set to be achieved by 2030. The efforts of national, regional, and global political and regulatory authorities, public and private economic actors, NGOs, and individuals influence the implementation of the multiple targets.

The attainment of the SDGs necessitates significant financial investments, amounting to billions of dollars (Haritas et al. [37]). The economic clout of MNEs is a crucial factor in determining their tangible impact on these goals. Consequently, their vast economic influence bestows them a critical role in advancing the SDGs. However, the sustainable management of entire supply chains remains one of the most formidable challenges confronting these enterprises (Kulkarni et al. [38]).

Society needs to clearly understand the impact that business models have on the planet and the footprint that businesses leave behind. The private sector's focus on long-term sustainability is addressed in the United Nations 2030 Sustainable Development Goal 9 on "Industry, Innovation, and Infrastructure", which aims to "build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation". By comparing the performance of long-established companies with that of new multinationals, the aim is to demonstrate the important link between innovation, intellectual property, sustainability, and corporate longevity through digital business models based on intellectual property (Denoncourt [39]).

Ylönen & Salmivaara [40] note that private businesses in the Sustainable Development Agenda 2030 formally assigned a key role in achieving the Sustainable Development Goals. Celone et al. [41] noted the importance and impact of MNEs on three macro-areas of interest that are indirectly related to SDG 7 and 13—energy and climate change, SDG 16 — peace, and SDG 1 and 10—poverty and inequality. However, MNE activities are also affected by other institutions whose actions influence the achievement of the SDGs. The author wrote that the initiatives of international companies can indirectly fight the causes of poverty

according to SDG 9—weak economy and SDG 4—lack of education. Multinational companies should abandon the pursuit of profit alone in pursuit of sustainable development goals. SDG 9 defines it as important to achieve the goal of industrialization to further develop countries.

In line with the 2030 Agenda for Sustainable Development, transnational corporations play an important role in promoting sustainable development and equality at a global level. Their impact includes waste management practices, the wide use of resources, and the implementation of integrated CSR strategies. Despite the high economic weight and ability to achieve the SDGs, multinational companies are often criticized for their inconsistent sustainability efforts. Authors such as Munro and Arli [34], Ivanaj et al. [35], and Van Zanten and Van Tulder [36] highlighted the crucial role of the private sector, especially multinational corporations, in achieving SDG. Achieving these objectives will require significant financial investments and coordinated action by various stakeholders, including political and regulatory authorities, economic operators, NGOs, and individuals.

In this context, it is important to understand the link between the activities of multinationals and their alignment with the SDGs, particularly SDG 9. SDG 9 focuses on building resilient infrastructure, promoting inclusive and sustainable industries, and fostering innovation. In this regard, it is important to examine how the different performance indicators of multinationals correlate with their progress towards SDG 9.

To do this, the authors analyzed the statistics and focused on the 100 largest European companies in terms of turnover and number of employees in 2020–2022. The correlation coefficient matrix in Table 5 promotes a correlation between indicators such as the number of countries represented virtually, the number of people employed in multinational enterprises, the number of domains, and the number of countries physically involved and their impact on SDG 9.

MATERIALS AND METHODS

The authors use Covariance analysis in this paper, focusing on applying Spearman's correlation method. ANCOVA (covariance analysis) is a statistical method that has been extended to include dispersion analysis (ANOVA). This allows us to compare methods with three or more groups and try at least one continuous covariance effect. ANCOVA is adapted to model the participation of independent variables. In such an application, the influence of independent qualitative variables on the dependent variable leads to more accurate conclusions.

ANCOVA is different from ANOVA. ANOVA compares group situations but does not check on group members. ANCOVA contains one or more variables with categorical variables.

ANCOVA has the main advantage. ANCOVA increases the statistical capacity, taking into account the internal variability of the group.

Confusing inconsistencies are achieved by correcting existing differences between groups.

ANCOVA helps control covariances, and Spearman's correlation method is applied to evaluate monotonic relationships. Spearman's step correlation is asymmetric and suitable for shared data, ranges, or connections. Spearman's correlation focuses on monotonic correlations. Monotonic relationships (where one variable grows similarly to another) are essential to Spearman's correlation.

In this study, it is used to measure the strength and direction of correlation between two variables. The Spearman rank correlation coefficient offers distinct advantages against the Pearson correlation coefficient. The Pearson correlation coefficient measures the linear relationship between two continuous variables. It assumes that the variables are normally distributed and that their relationship is linear. However, the Spearman correlation coefficient measures the non-linear relationship between two continuous variables. It assumes that the variables are not normally distributed and that their relationship is monotonic. Spearman's correlation coefficient robustness to outliers, suitability for non-linear relationships, and compatibility with ordinal data make it an essential tool for capturing complex and nuanced interactions.

Applying such a method combination improves understanding of data models and relationships.

RESULTS

The authors observed the companies established in the European Union from STATISTA data of 100 top European companies' revenue and number of employees due to 2020–2022 year.

The observed companies were also listed in the Fortune 500 list. The authors performed Spearman rank order covariance analysis and identified which indicators have the correlation potential. The correlation matrix is stated in the Table 5. The authors formed correlation coefficients to identify the middle-strength relationships among the indicators specified in Table 5. Some relationships of MNE indicators with SDG 9 were weaker, so they are not presented in Table 5.

Table 5. Correlation matrix.

Correlation	SDG 9	DIG	EMPLOY	NBR_DOM	NBR_PRE
SDG 9	1				
DIG	0.3745	1			
EMPLOY	0.4270	0.3288	1		
NBR_DOM	0.4417	0.6246	0.5540	1	
NBR_PRE	0.3868	0.4587	0.3886	0.5909	1

Herein, SDG 9 means Sustainable Development Goal 9; DIG—Number of Jurisdiction with Virtual Presence; EMPLOY—Employment in MNE; NBR_DOM—Number of Domains; NBR_PRE—Number of Jurisdictions with Presence.

Sustainable Development Goal (SDG 9) focuses on industry, innovation, and infrastructure. It aims to create sustainable infrastructure and support sustainable industries and innovation. It seeks competitive economic forces that create jobs and incomes and promote technological progress and equal access to information and financial markets.

Employment in multinational companies (international) shows job opportunities in international companies operating in different countries. Multinational companies create jobs by employing people in different places where they work. According to Fortune 500, on average, one MNE has 140 thousand employees worldwide. In general, SDG 9 emphasizes creating jobs through sustainable industrialization.

The number of jurisdictions with a presence indicator shows the countries/regions where your organization, institution, or company has started physical or operational operations. For example, some global banks operate locally in nearly 160 countries, allowing them to do business abroad.

The number of jurisdictions operating virtually shows business presence in virtual environement and global reach.

The number of domains indicator shows domain names registered on the Internet.

As of 2021, there are approximately 367 million domain names (owned by registrars) worldwide.

The identified relations are also stated in the Figure below.

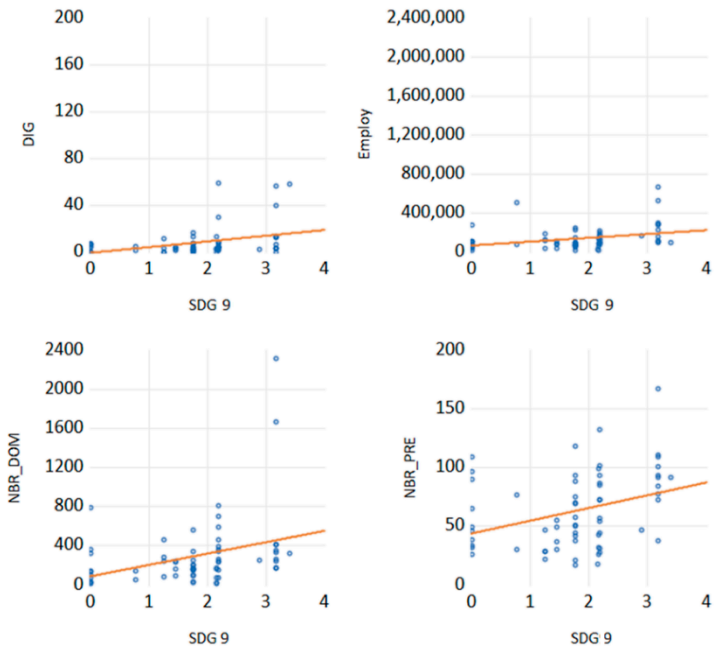

Figure 4. The visualization of the results of covariance analysis.

The defined correlations are shown in Figure 4, which shows the strength and direction of the correlations between the individual indicators and their compliance with SDG 9. This visualization helps to understand the relationship between digital and physical presence, occupancy, and sustainability goals. Relative analysis reveals several important correlations:

Goal 9 and employment (EMPLOYMENT): There is a rather positive correlation (0.4270), suggesting that multinational corporations tend to create more jobs when they focus on the SDGs. This is in line with SDG 9, which aims to promote job creation through sustainable industrialization.

SDG 9 and number of domains (NBR_DOM): The positive correlation (0.4417) suggests that companies with higher online activity are more likely to achieve SDG 9. This may be due to the growing importance of digital infrastructure in sustainable industrial practices.

SDG 9 and the number of physical beings in presence (NBR_PRE): This indicator has the highest correlation with SDG 9 (0.3868), which highlights the importance of the global physical presence in achieving the SDGs. Companies with a large operating base are likely to be better equipped to adopt sustainable practices and innovations.

DIG and NBR_DOM: A strong correlation (0.6246) suggests that companies with significant virtual activities also tend to have many registered industries, reflecting a strong digital strategy.

The results show that the physical presence of the MNE indicator is linked to the SDG 9 values the most.

The analysis found that the number of indicators of physical participation in multinational corporations correlates best with SDG 9, suggesting that achieving SDG 9 requires a solid global operational framework. In addition, the relationship between recruitment, digital activities, and the number of disciplines reflects the diversity of sustainability in the context of multinationals. Such analysis provides new insights into how European multinationals can use their global footprint and resources to contribute to implementing SDG 9 and other SDGs.

DISCUSSION

Trends in global issues raise concerns about social justice and resource scarcity and indicate a clear direction for mitigating climate change through sustainable solutions and development that include the responsibility of multinational corporations. Target-setting becomes more effective with a strong approach to sustainability that balances economic, environmental, and social consequences. In this work, the authors conduct a scientific analysis of the development of international companies and their links with sustainability, good practices, and knowledge sharing to achieve the goals of sustainable development of MNEs, focusing on the study of industry, innovation, and infrastructure characteristics. By analyzing practices, a modeling approach could help to identify priority areas for improvement, for example, by indicating the best sustainability

initiatives for MNEs. The research gap shows that applying an integrated approach to sustainability would benefit MNE's future development.

Integrating sustainability into multinational corporations is essential for long-term viability, social well-being, and environmental protection. The study identifies key economic, social, and environmental sustainability issues and highlights their importance for multinational companies. Economic sustainability means reducing waste through efficient production technologies and renewable energy sources. These practices increase profitability, achieve environmental goals, and respond to the urgent need for sustainable business conduct (Nižetić et al. [14]; Jawahir and Bradley [15]; Hu & Zheng [16]). In addition, maintaining resilient supply chains and ensuring transparency further strengthen countries' commitment to sustainability (Villena & Gioia [19]; Ebinger and Omondi [20]).

Social sustainability focuses on employee well-being and social responsibility, promotes diversity, and implements community-led initiatives. Ensuring good working conditions, decent pay, and inclusion are essential to promote a positive work environment and improve the company's reputation (Davidescu et al. [29]; Lopez-Cabrales and Valle-Cabrera [30]). Investments in educational programs and community projects demonstrate the commitment of international companies to promoting community development and community well-being (Maynard et al. [28]; Nousheen et al. [32]).

Environmental sustainability is achieved through strict environmental policies, including emission control, waste reduction, and resource conservation. Green innovation plays an important role in reducing the environmental impact of the production and development of sustainable products (Tronnebati & Jawab [22]; Hu & Zheng [16]). These initiatives not only reduce environmental degradation but also increase the competitiveness of national environmental organizations by bringing them into line with global sustainability standards.

Multinational corporations' high economic power and global reach allow them to influence waste management practices, implement CSR strategies, and foster innovation (Celone et al. [41]). Multinational companies can systematically assess and improve their sustainability performance through environmental impact assessment methodologies, contributing to sustainable infrastructure, inclusive industry, and sustainable development. Incorporating sustainability into business models means environmental and social responsibility, longevity, and success for companies in a rapidly changing global market (Ylönen & Salmivaara [40]). Analyzing the sustainability transition practices of international business groups can help researchers and policymakers assess environmental impacts. Policymakers can use this information and learn from these countries' successful waste management models. Implementing such strategies can reduce waste, reduce recycling rates, and overall sustainability.

These studies can drive sustainable development solutions for MNEs through innovative sustainability initiatives. Scholars can use this study to investigate the specific sustainable development practices of MNEs that lead to successful collaborations. Clustering of individual countries could encourage cooperation by sharing good practices. Knowledge-sharing platforms can help MNEs begin their transformation towards sustainability and exchange information.

Ultimately, these results provide policymakers, researchers, and practitioners with practical knowledge on improving MNEs' transition to sustainable solutions and sustainable development practices and promoting sustainable development and international cooperation. Future research directions could include the analysis of additional indicators reflecting the sustainable development practices of MNEs.

CONCLUSIONS

The paper provides a comprehensive overview of MNE development and links towards sustainability, helping to reach sustainable development goals, focusing on industry, innovation, and infrastructure. Multinational companies have great potential to bring about positive change, but reconciling economic growth with environmental and social responsibility and integrating sustainability into all operations remains difficult.

The 17 Sustainable Development Goals (SDGs) established by the United Nations provide a clear direction for the international community directly related to the decisions of multinational companies that contribute to the general well-being and environmental sustainability.

Bibliometric studies conducted by the authors provide an overview of the research environment with the participation of international companies. Using VOS viewer technology and analysis of peer-reviewed articles, the authors identified important groups of keywords. The clear link between sustainability and MNE was identified in the first cluster, which highlights MNE's role in shaping global sustainability. Under this cluster, the "Sustainability" keyword has 179 links, and the "Sustainable development goals" has 109 links.

The statistical analysis shows that multinational companies have an important role in embedding sustainability, especially in Germany and France, which have the largest labor force, and promote responsible business practices for a better future.

The analysis shows that European multinational corporations with extensive physical and virtual activities, many jobs, and a strong digital strategy are more likely to comply with and contribute to SDG 9. These companies are important in promoting sustainable industry development, innovation, and infrastructure. Despite the challenges of high upfront costs and regulatory divergences, integrating sustainability practices offers significant opportunities to achieve long-term profitability, better reputation, and competitive advantage. Multinational corporations must

continue to use their global influence and resources to promote sustainable development and achieve sustainable development goals.

Evaluating and improving the sustainability practices of multinational corporations is essential for advancing global sustainability initiatives. By focusing on cost-effectiveness, social responsibility, and environmental responsibility, multinational companies can achieve long-term success and contribute to sustainable development. By using their resources and implementing comprehensive sustainability strategies, multinational corporations can contribute significantly to global sustainability efforts and have positive economic, social, and environmental impacts. Integrating sustainability benefits companies and has long-term implications, such as contributing to building sustainable infrastructure, promoting sustainable and inclusive industries, and fostering innovation.

Further on, it is suggested that an integrated approach be applied. Multinational companies must adopt an integrated approach that means sustainable development in all operations.

The research has some limitations. Not all the MNE indicators have a middle-strength relationship. Some relationships between MNE indicators and SDG 9 were weaker.

DATA AVAILABILITY

Data will be available upon a reasonable request.

AUTHOR CONTRIBUTIONS

EL: Data analysis, literature review, writing & editing original draft; AB: Conceptualization, methodology, data analysis; OL: Data analysis, literature review, writing—review & original draft.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

APPENDIX

Table A1. Largest European Union Company names, countries, and business sector.

No.	Company name	Country	Sector
1	Uniper	Germany	3520—Manufacture & Distribution Through Mains
2	Omv	Austria	06—Gas & Petroleum Extraction
3	Polski Koncern Naftowy Orlen	Poland	1920—Refined Petroleum Products
4	Eni	Italy	1920—Refined Petroleum Products
5	Enbw	Germany	35—Electricity, Gas, Steam & Air Conditioning
6	Hapag-Lloyd	Germany	3011—Ships & Floating Structures
7	Rwe	Germany	3510—Power Generation, Transmission & Distribution
8	Repsol	Spain	1920—Refined Petroleum Products
9	Totalenergies	France	06—Gas & Petroleum Extraction
10	Naturgy Energy Group	Spain	3520—Manufacture & Distribution Through Mains
11	Engie	France	3520—Manufacture & Distribution Through Mains
12	A P Moller-Maersk	Denmark	5012—Sea & Coastal Freight Transportation
13	Dsv	Denmark	H—Transportation & Storage
14	Electricite De France	France	35—Electricity, Gas, Steam & Air Conditioning
15	E.On	Germany	35—Electricity, Gas, Steam & Air Conditioning
16	Lyondellbasell Industries	Netherlands	2022—Paints, Varnishes, Printing Ink & Mastics
17	Volvo	Sweden	2910—Motor Vehicles
18	Traton	Germany	2920—Motor Vehicle Bodies, Trailers & Semi-Trailers
19	Lvmh Moet Hennessy-Louis	France	110—Beverages
20	Christian Dior	France	2023—Cleaning Products, Perfumes & Toiletries
21	Veolia Environnement	France	3510—Power Generation, Transmission & Distribution
22	Iberdrola	Spain	3510—Power Generation, Transmission & Distribution
23	Inditex	Spain	4771—Clothing, Footwear & Leather Articles
24	Basf	Germany	20—Chemicals & Related Products
25	Air Liquide	France	2011—Basic Chemicals
26	Bmw	Germany	2910—Motor Vehicles
27	Thyssen Krupp	Germany	2599—Other Fabricated Metal Products
28	Accenture	Ireland	6202—Computer Consultancy & Facilities Management
29	Dhl Group	Germany	5320—Courier Services
30	Hannover Rueck	Germany	6520—Reinsurance
31	L'Oreal	France	2023—Cleaning Products, Perfumes & Toiletries
32	Schneider Electric	France	S—Other Services

Table A1. *Cont.*

No.	Company name	Country	Sector
33	Compagnie De Saint Gobain	France	2824—Mining, Quarrying & Construction Machinery
34	Stellantis	Netherlands	2920—Motor Vehicle Bodies, Trailers & Semi-Trailers
35	Dr. Ing. H.C. F. Porsche Ag	Germany	4510—Motor Vehicle Sales
36	Siemens Ag	Germany	27—Electrical Equipment
37	Anheuser-Busch Inbev	Belgium	1103—Malt Liquors & Malt
38	Volkswagen	Germany	2910—Motor Vehicles
39	Mercedes-Benz Group	Germany	2910—Motor Vehicles
40	Bayer	Germany	2100—Pharmaceuticals, Medicinal Chemical & Botanical Products
41	Umicore	Belgium	466—Other Specialized Wholesale Activities
42	Sanofi	France	2100—Pharmaceuticals, Medicinal Chemical & Botanical Products
43	X5 Retail Group	Netherlands	4711—Food, Beverages or Tobacco
44	Munich Re	Germany	6520—Reinsurance
45	Airbus	Netherlands	3030—Air & Spacecraft Machinery
46	Koninklijke Ahold Delhaize	Netherlands	47—Retail Trade, Except Motor Vehicles
47	Danone	France	1050—Dairy Products
48	Telefonaktiebolaget Lm Ericsso	Sweden	2630—Communication Equipment
49	Metro	Germany	47—Retail Trade, Except Motor Vehicles
50	Carrefour	France	47—Retail Trade, Except Motor Vehicles
51	Deutsche Telekom	Germany	61—Telecommunications
52	Sap	Germany	6201—Computer Programming
53	Fresenius	Germany	8690—Other Health Activities
54	Renault	France	2920—Motor Vehicle Bodies, Trailers & Semi-Trailers
55	Medtronic	Ireland	2660—Irradiation, Electromedical & Electrotherapeutic Equipment
56	Continental	Germany	221—Rubber Products
57	Allianz	Germany	651—Insurance
58	Financiere De L'Odet	France	68—Real Estate
59	Bollore	France	H—Transportation & Storage
60	Telefonica	Spain	61—Telecommunications
61	Cnh Industrial	Netherlands	2824—Mining, Quarrying & Construction Machinery

REFERENCES

1. Bradley WA, Duruflé G, Hellmann TF, Wilson KE. Cross-border venture capital investments: What is the role of public policy? J Risk Financial Manag. 2019;12(3):112.
2. Celone A, Cammarano A, Caputo M, Michelino F. Is it possible to improve the international business action towards the sustainable development goals? Crit Perspect Int Bus. 2022;18(4):488-517.
3. Shenkar O, Luo Y, Chi T. International Business. 4th ed. London (UK): Routledge; 2021.
4. Rugman A, Verbeke A. A perspective on regional and global strategies of multinational enterprises. J Int Bus Stud. 2004;35(1):3-18.
5. European Commission. The European Green Deal: COM(2019) 640 final. Available from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2019%3A640%3AFIN. Accessed on 15 Oct 2024.
6. Statista. Top 100 companies worldwide. Available from: https://www.statista.com/companies/methodology. Accessed on Mar 2023.
7. Duffy A, Kirk N, Lambert P. Cross-cultural competency and international business: navigating complexity and fostering diversity. Cross Cult Bus Rev. 2022;12(3):255-78.
8. Aharoni Y. Insights into the future of international business. Available from: https://documents.aib.msu.edu/publications/insights/archive/insights_v011n02.pdf#page=3. Accessed on 12 Oct 2024.
9. OECD. International Business and Labour Standards. OECD Emp Outlook. 2018;1:145-70.
10. Dempere J, Qamar M, Allam H, Malik S. The impact of innovation on economic growth, foreign direct investment, and self-employment: a global perspective. Economies. 2023;11(7):182.
11. Lewis M, Van Eck NJ, Waltman L. Mapping scientific frontiers using VOS viewer. J Informetr. 2010;4(3):444-53.
12. Waltman L, Van Eck NJ, Noyons ECM. A unified approach to mapping and clustering of bibliometric networks. J Informetr. 2010;4(4):629-35.
13. Waltman L, Van Eck NJ. A smart local moving algorithm for large-scale modularity-based community detection. Eur Phys J B. 2013;86(11):471.
14. Nižetić S, Djilali N, Papadopoulos A, Rodrigues JJ. Smart technologies for promotion of energy efficiency, utilization of sustainable resources and waste management. J Clean Prod. 2019;231:565-91.
15. Jawahir IS, Bradley R. Technological elements of circular economy and the principles of 6R-based closed-loop material flow in sustainable manufacturing. Procedia Cirp. 2016;40:103-08.
16. Hu N, Zheng B. Natural resources, education, and green economic development. Res Policy. 2023;86:104053.
17. Kumar M. Social, economic, and environmental impacts of renewable energy resources. In: Okedu KE, Tahour A, Aissaou AG, editors. Wind Solar Hybrid Renewable Energy System. London (UK): IntechOpen; 2020. p. 227-37.

18. Ko S, Kim W, Shin SC, Shin J. The economic value of sustainable recycling and waste management policies: The case of a waste management crisis in South Korea. Waste Manag. 2020;104:220-7.
19. Villena VH, Gioia DA. A more sustainable supply chain. Harvard Bus Rev. 2020;98(2):84-93.
20. Ebinger F, Omondi B. Leveraging digital approaches for transparency in sustainable supply chains: A conceptual paper. Sustainability. 2020;12(15):6129.
21. Bui TD, Tseng JW, Tseng ML, Lim MK. Opportunities and challenges for solid waste reuse and recycling in emerging economies: A hybrid analysis. Resour Conserv Recycl. 2022;177:105968.
22. Tronnebati I, Jawab F. Green and Sustainable Supply Chain Management: A Comparative Literature Review. Jordan J Mech Ind Eng. 2023;17(1):115-26.
23. Küfeoğlu S. SDG-9: industry, innovation and infrastructure. In: Küfeoğlu S, editor. Emerging Technologies: Value Creation for Sustainable Development. Cham (Switzerland): Springer International Publishing; 2022. p. 349-69.
24. Singh B. Federated learning for envision future trajectory smart transport system for climate preservation and smart green planet: Insights into global governance and SDG-9 (Industry, Innovation and Infrastructure). Natl J Environ Law. 2023;6(2):6-17.
25. Saint Akadiri S, Alola AA, Akadiri AC, Alola UV. Renewable energy consumption in EU-28 countries: policy toward pollution mitigation and economic sustainability. Energy Policy. 2019;132:803-10.
26. Madaleno M, Nogueira MC. How renewable energy and CO_2 emissions contribute to economic growth and sustainability—an extensive analysis. Sustainability. 2023;15(5):4089.
27. Jabbour CJC, Fiorini PDC, Ndubisi NO, Queiroz MM, Piato ÉL. Digitally-enabled sustainable supply chains in the 21st century: A review and a research agenda. Sci Total Environ. 2020;725:138177.
28. Maynard DDC, Vidigal MD, Farage P, Zandonadi RP, Nakano EY, Botelho RBA. Environmental, social and economic sustainability indicators applied to food services: A systematic review. Sustainability. 2020;12(5):1804.
29. Davidescu AA, Apostu SA, Paul A, Casuneanu I. Work flexibility, job satisfaction, and job performance among Romanian employees—Implications for sustainable human resource management. Sustainability. 2020;12(15):6086.
30. Lopez-Cabrales A, Valle-Cabrera R. Sustainable HRM strategies and employment relationships as drivers of the triple bottom line. Hum Resour Manag Rev. 2020;30(3):100689.
31. Jonsen K, Point S, Kelan EK, Grieble A. Diversity and inclusion branding: a five-country comparison of corporate websites. Int J Hum Resour Manag. 2021;32(3):616-49.
32. Nousheen A, Zai SAY, Waseem M, Khan SA. Education for sustainable development (ESD): Effects of sustainability education on pre-service teachers' attitude towards sustainable development (SD). J Clean Prod. 2020;250:119537.

33. de Oliveira RT, Ghobakhloo M, Figueira S. Industry 4.0 towards social and environmental sustainability in multinationals: Enabling circular economy, organizational social practices, and corporate purpose. J Clean Prod. 2023;430:139712.
34. Munro V, Arli D. Corporate sustainable actions through United Nations sustainable development goals: The internal customer's response. Int J Nonprofit Volunt Sect Mark. 2020;25(3):e1660.
35. Ivanaj S, Ivanaj V, McIntyre J, da Costa NG. What can multinational enterprises do to implement sustainable development goals? J Clean Prod. 2021;296:126586.
36. Van Zanten JA, Van Tulder R. Multinational enterprises and the Sustainable Development Goals: An institutional approach to corporate engagement. J Int Bus Policy. 2018;1(3):208-33.
37. Haritas I, Das A. Simple doable goals: a roadmap for multinationals to help achieve the UN's sustainable development goals. Soc Bus Rev. 2023;18(4):618-45.
38. Kulkarni S, Hof A, Ambrósio G, Edelenbosch O, Köberle AC, van Rijn J, et al. Investment needs to achieve SDGs: An overview. PLOS Sustain Transform. 2022;1(7):e0000020.
39. Denoncourt J. Companies and UN 2030 sustainable development goal 9 industry, innovation and infrastructure. J Corp Law Stud. 2020;20(1):199-235.
40. Ylönen M, Salmivaara A. Policy coherence across Agenda 2030 and the Sustainable Development Goals: lessons from Finland. Dev Policy Rev. 2021;39(5):829-47.
41. Celone A, Carraresi L, Bravi L. The impact of multinational enterprises on environmental, social, and economic sustainability in emerging economies. J Clean Prod. 2022;33:137494.

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