TWENTY-FIVE YEARS OF "E&M ECONOMICS AND MANAGEMENT": A BIBLIOMETRIC ANALYSIS

Xuan Yao[1], Zeshui Xu[1,2], Miroslav Zizka[3]

[1] Southeast University, School of Economics and Management, China, ORCID: 0000-0002-8549-2096, shiny_yao@yeah.net;

[2] Sichuan University, Business School, China, ORCID: 0000-0003-3547-2908, xuzeshui@263.net (corresponding author);

[3] Technical University of Liberec, Faculty of Economics, Czech Republic, ORCID: 0000-0002-7804-3954, miroslav.zizka@tul.cz.

Abstract: *E&M Economics and Management (E&M), originally founded in 1998, is dedicated to promoting advancements in the fields of Economics and Management based on theoretical and empirical analyses. Motivated by its 25th anniversary in 2023, this paper utilizes bibliometrics to make a comprehensive analysis of publications of the E&M that are included in Social Sciences Edition of the Web of Science (WoS). First, we make a performance analysis of the related publications to present the development and distribution of the E&M publications between January 2008 and April 2022 from the aspects of publication and citation structure. Second, a visual analysis of the literature called science-mapping analysis is implemented to display the structural and dynamic organization of knowledge of the E&M publications with the help of bibliometric tools VOSviewer and Bibliometrix. Finally, the paper discusses the evolution of E&M and some of the limitations and prospects to help editors and researchers understand how E&M has evolved over time and where it can be improved. This paper also provides a model of future effective analytical methods for assessing the data from a particular journal. According to the findings, researchers throughout the world publish in this journal on a regular basis. E&M is growing significantly during twenty-five years, and is becoming one of the influential journals in the fields of Economics and Management.*

Introduction

This year, *E+M Ekonomie a Management/E&M Economics and Management* journal will celebrate its 25th anniversary. On this occasion, we have prepared an analysis that maps the development of the journal over the past years and highlights the main milestones. Let us briefly reminisce about the history of the journal.

The journal was founded in the second half of 1998 on the initiative of the first dean of the Faculty of Economics (Technical University of Liberec). Associate Professor Jaroslav Jágr approached other deans of faculties of economics and management in the Czech Republic with the idea of establishing a new journal. These were the faculties in Hradec Králové, Pardubice, Plzeň, Ústí nad Labem and Zlín. The Faculty of Economics, the Technical University of Liberec became the coordinator and the editorial office seat. The journal was originally intended mainly for young researchers. In 1998, there was published the first and the only issue. From the

next year onwards, the periodicity of publication was fixed at four issues per year. In some years special issues were also published. However, these were later withdrawn.

The year 2003 can be considered a crucial year in the development of the journal. First, the editorial team was expanded by the first university from abroad (Košice, Slovakia) and at the same time the editorial board decided to transform the journal into a scientific journal with the ambition to be indexed in renowned databases. In 2005 a faculty from Karviná became a member of the editorial team, and in 2006, a second university from Banská Bystrica (Slovakia) joined the team. In 2006, a scientific board of the journal was also established, which gave a number of suggestions for the improvement of the journal. In the same year, the journal was also registered in the first database – EconLit. Shortly afterwards, the journal was accepted in the International Bibliography of the Social Sciences and Inspec databases. Since 2007, the journal has been indexed in the Scopus, Cabell and EBSCO databases. In 2008, *E&M* was classified within the Social Sciences Edition of the Web of Science (WoS), Thomson Reuters. In 2010, the journal *E&M* was first introduced in the Journal Citation Reports and achieved the impact factor (IF). In 2015, the editorial board decided to make another significant change. In order to increase the international impact of the journal, since 2015 all articles have been published strictly in English.

Let us also recall the individual editors-in-chief of the journal: 1998–2000 Jaroslav Jágr (as a chairman of the editorial board, the Technical University of Liberec), 2001–2002 Jan Ehleman (the Technical University of Liberec), 2003–2005 Jiří Kraft (the Technical University of Liberec), 2006–2012 Olga Hasprová (the Technical University of Liberec), 2013–2015 Mária Uramová (Matej Bel University in Banská Bystrica), 2016–2018 Beáta Gavurová (the Technical University of Košice), 2019–2022 Miroslav Plevný (University of West Bohemia in Pilsen) and from 2022 Renáta Myšková (University of Pardubice) is the editor-in-chief.

E&M Economics and Management (*E&M*) is an international journal (Print ISSN: 1212-3609; Online ISSN: 2336-5064) dedicated to publishing high quality, rigorously double-blind peer reviewed, original research articles and scientific studies based on a theoretical and empirical analysis in emerging and cutting-edge research domains of Business and Economics. The main topics of *E&M* are Economics, Business Administration, Finance, Management, Information Management, and Marketing & Trade, as introduced in the homepage of the journal. The last IF of the journal is 1.422 in 2021 by Journal Citation Reports where it is referred to in two categories while ranking 266th of 379 journals in the category of Economics and 206th of 226 journals in the category of Business, Management & Accounting. The peak value (1.446) of the IF of *E&M* was reached in 2020. The *E&M* journal is now popular and recognized in the scientific community, especially in Europe. It is also indexed and abstracted in nearly 10 databases, such as the Social Sciences Citation Index (SSCI) of Web of Science (Clarivate Analytics), Social Sciences Edition, Scopus, Cabell, etc. At present, *E&M* publishes quarterly by the Technical University of Liberec in close cooperation with other eight universities and the Wolters Kluwer publishing house.

Since its establishment in 1998, the journal *E&M* has gone through a long historical evolution and has published more than 800 documents that have contributed to the relevant fields. In addition, the *E&M* journal will celebrate its 25th anniversary in 2023, which demonstrates its long-standing establishment and impact on an academic scholarship. How to utilize the information of these documents comprehensively is a valuable issue worth thinking about in the process of analyzing the evolution of *E&M*. Inspired by this event, the main aim of this paper is to provide a thorough bibliometric analysis of the journal *E&M* during the twenty-five years.

A scientific paper usually contains a lot of information such as publication year, institutions, funding, citations, etc. To show the qualities, aspects of keywords, and relationships of authors, institutions, and countries/regions of the publications, a systematic analysis is required. Bibliometrics is precisely a method that has been considered a better statistical and quantitative analysis of the bibliographic features of a body of academic literature. Bibliometrics for a particular journal has been well developed since the 1960s, when the use of publications was examined by applying mathematical and statistical methods (Pritchard, 1969). Many other journals, especially for the celebration of a special event, have already advanced a bibliometric overview of their journals. Yu et al.

(2017) and Merigo et al. (2018) provided a comprehensive overview of the publications in the journal *Information Sciences* from 1968 to 2016 on a basis of bibliometric and customized text mining techniques. Yu et al. (2019) identified the characteristics and evolution of the *Technological and Economic Development of Economy* journal through a number of indicators commonly used in bibliometrics as well as various newly designed indicators. Wang et al. (2021) made a celebration of the 50th anniversary of the journal *International Journal of Systems Science* with a review of the past and trends for the future with bibliometric analysis and time series analysis. Xiao et al. (2022) developed a bibliometric analysis of the ten years of publications of the journal *Buildings* for the 10th anniversary in 2021. As this paper aims to explore the influential scientific literature information of *E&M*, we choose the WoS Core Collection in WoS (WoSCC) as the database source, which includes the SSCI index. Supplementary characteristics from the Scopus database are also listed.

Literature study frequently necessitates a great deal of knowledge on the part of the reviewer. The digitization of scientific journals has accelerated the paper production process, resulting in a traditional systematic literature analysis process that can no longer handle hundreds or thousands of publications (Qin et al., 2022). In 2008, the editorial office has summarized the background of the establishment and development of the *E&M* journal (Zizka, 2008). Furthermore, due to manual screening, some critical studies may be missing. To develop a high-level and comprehensive evaluation of the current state of work published by *E&M*, this paper uses bibliometric analysis to grasp the basic characteristics and dynamic evolution of the publications. To be more specific, this paper makes three major contributions:

1. Fully comprehend the temporal and spatial distribution characteristics of the *E&M* publications obtained from the annual indicators, research areas, productive institutions, authors, and citations overall.
2. Initiate the conceptual structure with a co-occurrence analysis of keywords to identify research hotspots, and then demonstrate the intellectual and social structure of the *E&M* publications to visualize the evolution of the co-citation network and country collaboration map.
3. Focus on the systematic literature review and analysis of the research hotspots of the publications to look ahead the journal *E&M*.

This paper focuses on quantitative research on the *E&M* publications from the last twenty-five years. The remaining part of the paper is organized as follows: Chapter 1 describes the data sources and methodology for bibliometric analysis. Chapter 2 presents the results of bibliometric analysis, including the descriptive statistics analysis of the leading authors, institutions, and countries and the publication and citation structure, and a detailed science mapping analysis of collaboration networks of the documents. Finally, some discussions and conclusions are summarized in Chapter 3 and the last Conclusions part respectively.

1. Research Methodology

This study mainly screens *E&M* publications included in WoSCC and further explores the development and evolution of the *E&M* journal using bibliometric methods and visualization tools by exporting the full record of these publications. Therefore, this section describes the process of data acquisition and the methodology of bibliometrics analysis. Bibliometrics is an established discipline that can identify key features in publications and analyze structured efforts (Yu et al., 2019). The primary objective of the bibliometric analysis is to provide a systematic and visually appealing overview of the existing publications (Xiao et al., 2022). Bibliometrics can appraise the main characteristics and evolution of scientific activities in the research field by employing some statistical methods (Broadus, 1987). Bibliometric analysis of the publications of *E&M* is indispensable as it could provide convenient information to all *E&M* stakeholders.

In this study, we use VOSviewer and Bibliometrix package named Biblioshiny as the tools for bibliometric visualization. VOSviewer is a tool for building and visualizing bibliometric networks based on the Java environment to run (van Eck & Waltman, 2010). It can build networks based on citations, bibliographic coupling, co-citation, co-author relationships, etc. The VOSviewer software can only concentrate on the journal's publications and the citations generated within those publications. Citations from other journals were not considered when calculating the overall impact of this set of documents on the scientific community (Merigo et al., 2019). Simultaneously,

VOSviewer is highly compatible, and it can be integrated with other software tools such as Pajek and Graphica to conform to its network layout for clearer and more directly visual graphics. The VOSviewer software enhances the meaning of traditional bibliometric analysis methods and introduces some excellent picture analysis tools (Infographics), such as Bibliometric science mapping. Bibliometric science mapping analysis represents a way of assessing academic developments or characteristics in the form of pictures. This type of graph integrates various aspects of information and presents the results through horizontal and vertical coordinates, colors, sizes, labels, etc. The Bibliometrix packages based on R language are employed for scientific mapping analysis, which can perform similar functions as VOSviewer. This study uses the Biblioshiny

package for scientific measurement and optical network analysis. Biblioshiny package is a web page data analysis framework based on some original functions of the Bibliometrix package, using the shiny package of the R language for secondary development and optimization. Users can directly perform relevant measurement visualization analysis in the web interface. Actually, bibliometric analysis is essentially a quantitative research method, which measures the social structure of documents in dissemination. Therefore, we sort out the research status and research hotspots of *E&M* publications and visualize the collaboration networks by the tools.

The data source of this paper is obtained from the WoSCC, SSCI database included its publications from 2008 to now, so the time span is set as 2008–2022. The specific retrieval

Tab. 1: Descriptive statistics of the *E&M* publications

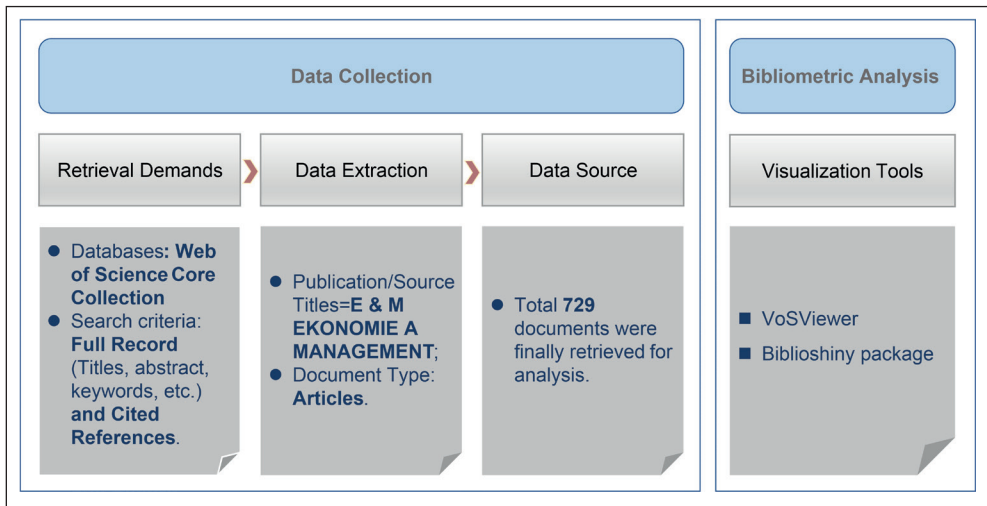| Descriptive statistics	Results
Main information	
Time span	2008–2022
Sources journals	1
Documents	817
Average citations per document	5.938
Average citations per year per document	0.7519
References	23,999
Document types	
Article	729
Document contents	
Author's keywords	2,649
Keywords Plus	1,141
Authors	
Authors	1,358
Author appearances	1,864
Authors of single-authored documents	194
Authors of multi-authored documents	1,164
Authors collaboration	
Single-authored documents	253
Documents per author	0.602
Authors per document	1.66
Co-authors per document	2.28
Collaboration Index	2.06

Source: own

strategies are as follows: Publication/Source Titles = E & M EKONOMIE A MANAGEMENT; Timespan = 2008–2022; Databases = Web of Science Core Collection; Document Type: All, and obtained 821 documents as of April 25, 2022, which include author names, titles, abstracts, published dates, document types, addresses, and cited references, etc. The types of documents include Articles (729), Book Reviews (88), Editorial Materials (3), and Biographical-Items (1). In this study, only Articles (729) are extracted as the original data source for bibliometric analysis (Tab. 1).

The analysis uses a wide range of bibliometric indicators including the total number of publications and citations, the ratio of cites per paper, the h-index, citation thresholds, etc. The two main goals of bibliometric analysis in this study are to explore how the number of publications reflected productivity and the number of citations that focused on the involvement and popularity of a document (Merigo et al., 2019). A combination of bibliometric and manual statistics is adopted to conduct a scientific quantitative analysis of the *E&M* publications. On this basis, the evolution of the *E&M* publications is analyzed and discussed by a systematic literature review method to identify potential research challenges. The methodology framework of this paper is shown in Fig. 1.

Fig. 1: Methodology framework of this paper

Source: own

2. Research Results

As mentioned above, there are 729 *E&M* articles included in the SSCI database over the last twenty-five years. This section provides a detailed analysis of all the *E&M* publications by year. Results of the bibliometric analysis are presented, including performance analysis and science mapping analysis.
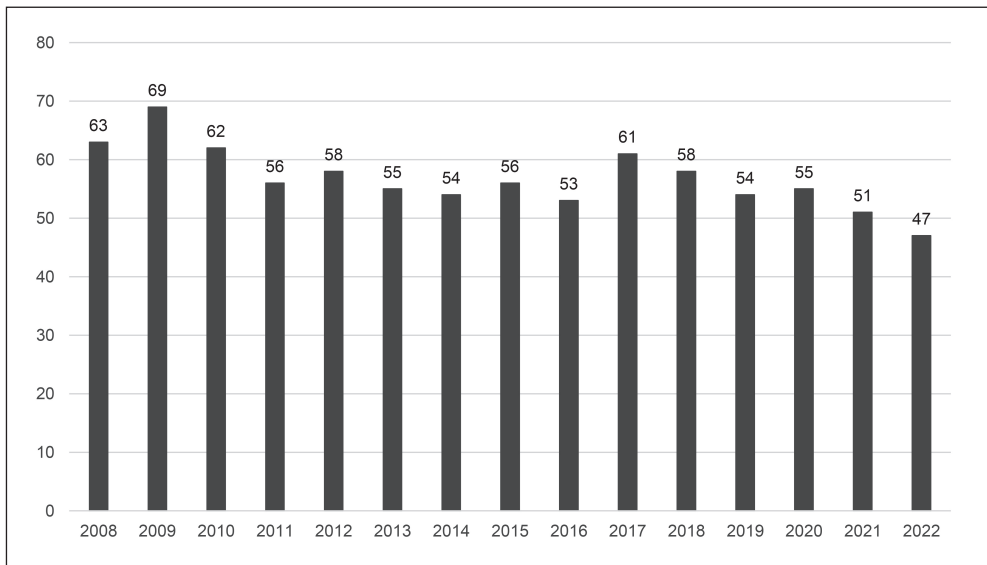
2.1 Performance Analysis

In general, performance analysis presents the descriptive statistics of the publication and citation structure, including the leading authors, institutions and countries/regions, and the most cited articles. The development status of the journal will also be analyzed.

Fig. 2 shows the annual evolution of the number of papers published in the journal over the entire lifetime of the journal. However, the beginning of the analysis is in 2008, when the *E&M* journal was included in the WoSCC database. Due to the introduction of the Journal Citation Reports for the first time in 2010 and the achievement of an IF, the publication volume of

Fig. 2: **Annual number of the *E&M* publications**

Source: own

E&M has been somewhat controlled. The policy of the editorial board is to maintain the quality of the journal and not to increase the number of articles published. In recent times, the number of published articles has reached as high as 55 per year.
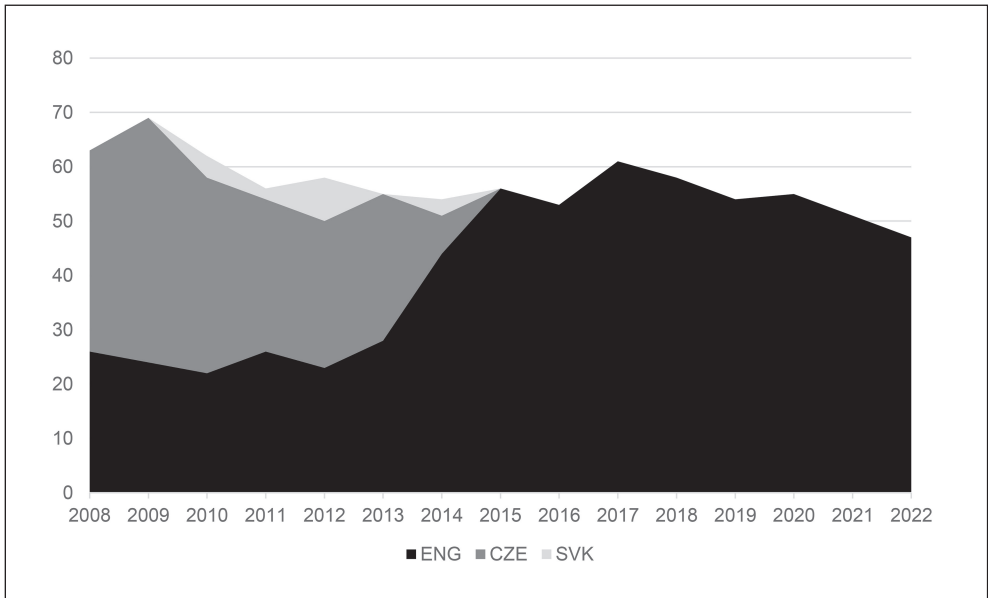
Since the *E&M* journal was founded in the Czech Republic, the number of articles published in the Czech or Slovak languages was consistently higher than in English between 2008 and 2013, until 2014, when only seven articles were published in Czech or Slovak and forty-four in English, and since 2015, all publications of the *E&M* journal are published in English, which is related to a change in the journal's strategy towards increasing the international impact of the outputs. The detailed line graph of language change of the *E&M* publications with respect to year is displayed in Fig. 3.

Fig. 4 presents the annual enlargement of total citations of *E&M* publications. Although the number of publications of the journal *E&M* was high between 2008 and 2010, the total number of *E&M* citations was relatively low. It can be concluded that the starting base was low. Since then, it began to grow steadily for three years (2011–2013) and suddenly exceeded the

400-citation threshold in 2014. Total citations of *E&M* have trended upward in the last eight years, but with fluctuation, with four distinct peaks in 2015 (562), 2017 (571), 2020 (615), and 2021 (581), respectively, indicating publications with a massive following in those years. The decline in citations in 2018 and 2019 may be swayed by the immediacy and time delay of recent publications being widely recognized and cited. According to the current trend, this journal published 47 articles with 433 citations in the first nine months of 2022, so the number of total citations is predicted to reach 600 in the year 2022 as well.
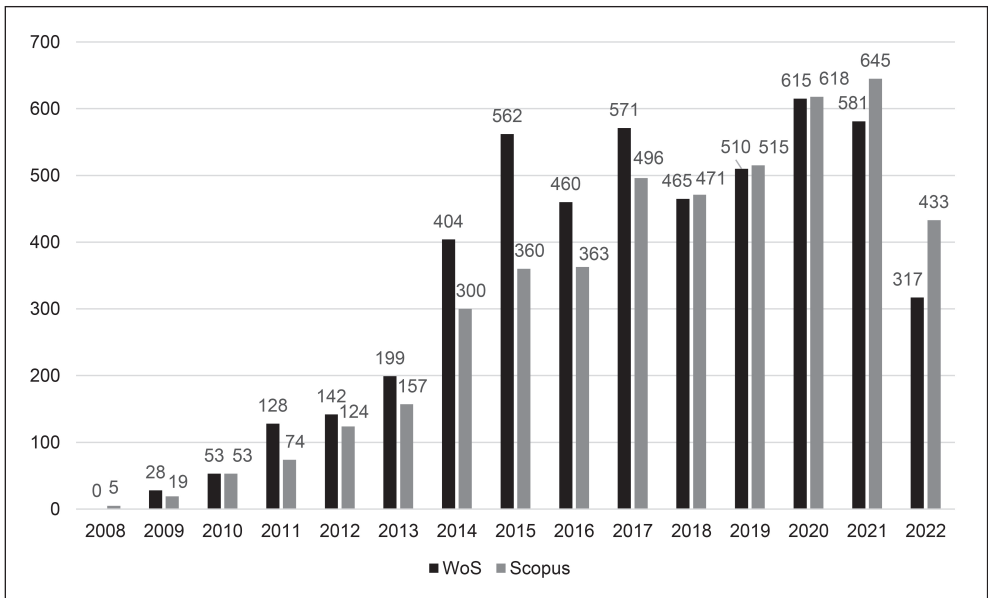
Increasing numbers of citations, with a stable number of articles published per year, led to an increase in the journal's impact factor (Fig. 5). The journal's impact factor reached its peak so far in 2020. Since 2017, the Article Influence Score (AIS) metric has been used in the Czech Republic to evaluate journals. This metric reflects the average impact of articles over the five years since their publication, and does not include self-citations. As shown in Fig. 5, in addition to the increasing impact factor, the AIS has recently increased considerably. This means that the impact of each article

Fig. 3: Graph of language change of the *E&M* publications with year

Source: own

Fig. 4: Annual total citations of the *E&M* publications

Source: Web of Science – Citation Report; Scopus – Citation Overview

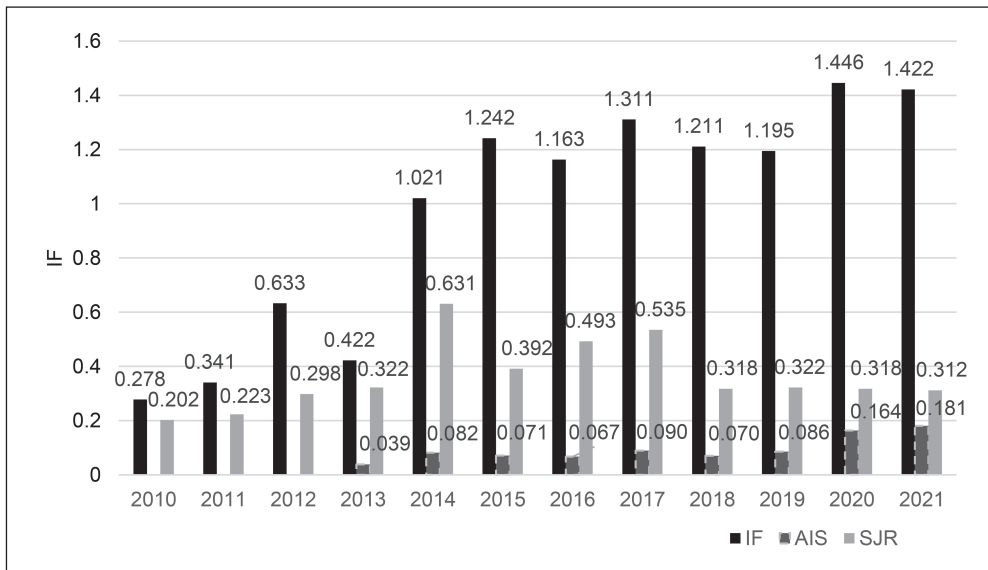published in *E&M* on the scientific community is increasing.

A similar metric that assesses the impact of published articles is the SCImago Journal Rank (SJR). The SJR measures the total number of citations to a journal and the reputation or level of citations to the journal, was developed by the SCImago team using the widely known Google PageRank algorithm. Meanwhile, the objectives and scope of the journal, the quality of its editorial board, IF, and the quality of papers are taken into account. The development of the SJR metric is shown in Fig. 5.

According to both metrics (IF, JCR), journals can be classified into four equal groups: Q1, Q2, Q3, and Q4. Journals in the Q1 and Q2 echelons are top-tier journals, while journals in the Q3 and Q4 echelons are relatively low-ranking journals. In Web of Science, the journal is classified into two categories – Economics, and Management. In Scopus, it is included in three categories – Business and International Management; Economics, Econometrics and Finance; and Strategy and Management. The historical IF and SJR performances of individual research categories covered by *E&M* are shown

in Fig. 6. Q1 (green) comprises the quarter of the journals with the highest values, Q2 (yellow) the second highest values, Q3 (orange) the third highest values, and Q4 (red) the lowest values. In Web of Science, the journal achieved the best ranking in 2014–2017, when it was in the second quartile in the Economics category and in the third quartile in the Management category. We can see that according to the SJR the division of the *E&M* is at the Q2 level on average overall, and the classifications of "Business and International Management" and "Economics" also maintained the Q1 level during 2014–2017, but the ranking has decreased in the last three years, producing a regression in development.

Fig. 7 depicts the top twelve research areas of publications based on Web of Science analytical results. All publications belong to the Business Economics field. All publications fall under the category of Business Economics, accompanied by 289 articles (39.64%) attributed to the field of Computer Science at the same time, followed by Mathematics (19.75%) and Engineering (13.71%). The publications of *E&M* are also widespread in Social Issues

Fig. 5: Historical development of *E&M* Impact Factor, Article Influence Scores and SCIMAGO Journal Rank
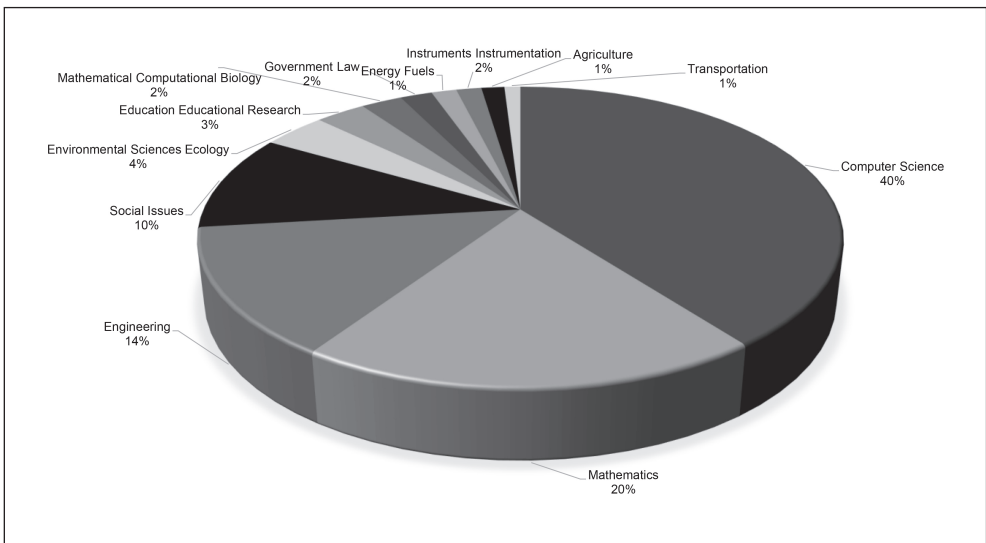

Source: InCites Journal Citation Reports; Scopus – Journal Metrics

Fig. 6:   Historical IF and SJR performances of *E&M*

Economics	x	x	Q4	Q4	Q3	Q3	Q2	Q2	Q2	Q2	Q3	Q3	Q3	Q3
Management	x	x	Q4	Q4	Q4	Q4	Q3	Q3	Q3	Q3	Q4	Q4	Q4	Q4
Business and International Management	Q2	Q2	Q2	Q2	Q2	Q2	Q1	Q1	Q2	Q2	Q2	Q2	Q3	Q3
Economics, Econometrics and Finance (miscellaneous)	Q3	Q3	Q3	Q2	Q2	Q2	Q1	Q1	Q1	Q1	Q2	Q2	Q2	Q2
Strategy and Management	Q3	Q3	Q3	Q2	Q2	Q2	Q2	Q2	Q2	Q2	Q3	Q3	Q3	Q3
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021

Source: Jcr.clarivate.com; scimagojr.com

Fig. 7:   Top 12 research areas of the *E&M* publications

Source: own

(10.29%), Environmental Sciences Ecology (3.84%), Education Educational Research (3.02%), Mathematical Computational Biology (2.47%), Government Law (1.92%), Energy Fuels (1.51%), Instruments Instrumentation (1.51%), Agriculture (1.51%) and Transportation (0.96%). It can be clearly seen that the impact of *E&M* publications has extended across many fields and linking research in both social science and natural science.

Based on the above characteristics of research areas, we can more clearly identify some of the main trends in the discussion in *E&M* journals. In fact, the discussion covers social issues in many sectors, mainly using methods such as computer science, mathematics or statistics, and engineering to solve them. In more detail, the most cited paper was published by Jaroslav Belas, Valer Demjan, Jozef Habanik, and Maria Hudakova in collaboration

with Juraj Sipko in 2015 with 62 citations (Belás et al., 2015). The manuscript was based on objectives, motivating factors, social status, level of corruption, current business risks, the loan financing methods, ability to manage financial risks and business optimism in the business environment, to define and compare current trends in the business environment for SMEs in selected regions of the Czech Republic and Slovakia. The second most cited paper was cited 51 times, which falls under the field of social issues (Šoltés & Gavurová, 2014). The authors, Vincent Šoltés, and Beáta Gavurová, discussed the functions of ambulatory surgical care compared to the traditional inpatient system, using the opinions of experts representing the Slovak healthcare system. The third most cited paper was published by Zsuzsanna K. Szabo, Michal Soltes, and Emilia Herman with 51 citations (Szabo et al., 2013). They aimed to analyze and compare the innovation capacity and

performance of transition economies at the firm level, through CEE countries and barriers and challenges for southern European countries compared to advanced economies, identifying weaknesses and local, particular strengths of innovation in the (post) crisis period, and defining targets for the next period. The top 20 most cited documents in *E&M* publications are shown in Tab. 2. The above three papers were published relatively early, and we notice that the papers written by Dabija D. C., Bejan B. A. M., and Tipi N. in 2018 have the highest average annual citations (citations per year). Dabija et al. (2018) used the information available on social media to make recommendations for the behavior of generation X and millennials when buying food and travel services, providing retailers with the opportunity to better understand the behavior of customers across different age groups, thus making their targeting more successful. Although the study was published only

Tab. 2: Top 20 most cited documents in *E&M* according to WoSCC – Part 1

R	Title	Author/s	TC	Year	C/Y
1	The business environment of small and medium-sized enterprises in selected regions of the Czech Republic and Slovakia	Belas J., Demjan V., Habanik J., Hudakova M., Sipko J.	62	2015	7.75
2	The functionality comparison of the health care systems by the analytical hierarchy process method	Soltes V., Gavurova B.	51	2014	5.67
3	Innovative capacity & performance of transition economies: Comparative study at the level of enterprises	Szabo Z. K., Soltes M., Herman E.	51	2013	5.10
4	Source identification of potential malfunction of balanced scorecard system and its influence on system function	Gavurova B.	50	2012	4.55
5	Motivation and barriers of ICT adoption in small and medium-sized enterprises	Antlova K.	45	2009	3.21
6	Generation X versus millennials communication behaviour on social media when purchasing food versus tourist services	Dabija D. C., Bejan B. A. M., Tipi N.	42	2018	8.40
7	Multi-criteria group decision-making using an extended EDAS method with interval type-2 fuzzy sets	Keshavarz Ghorabaee M., Amiri M., Zavadskas E. K., Turskis Z.	41	2017	6.83

Tab. 2: Top 20 most cited documents in *E&M* according to WoSCC – Part 2

R	Title	Author/s	TC	Year	C/Y
8	Cluster analysis of households characterized by categorical indicators	Rezankova H., Loster T.	39	2013	3.90
9	Business intelligence as a key information and knowledge tool for strategic business performance management	Rajnoha R., Stefko R., Merkova M., Dobrovic J.	38	2016	5.43
10	Relationship of speed certificates and inverse vertical ratio call back spread option strategy	Soltes M.	38	2010	2.92
11	Outsourcing of facility management	Vetrakova M., Potkany M., Hitka M.	37	2013	3.70
12	Quantification effectiveness activities traffic company by the rules of data envelopment analysis	Kliestik T.	37	2009	2.64
13	Factors of tourism's competitiveness in the European union countries	Marakova V., Dyr T., Wolak-Tuzimek A.	34	2016	4.86
14	Engel's approach as a tool for estimating consumer behaviour	Benda-Prokeinova R., Dobes K., Mura L., Buleca J.	33	2017	5.50
15	The effect of rating changes on the value of a company listed in the capital market	Uzik M., Soltes V.	33	2009	2.36
16	The cooperation between enterprises: Significant part of the innovation process – A case study of the Czech machinery industry	Stejskal J., Merickova B. M., Prokop V.	32	2016	4.57
17	Changes of employee motivation of Slovak enterprises due to global economic crisis	Zavadsky J., Hitka M., Potkayn M.	31	2015	3.88
18	Prediction bankruptcy models validation in Slovak business environment	Delina R., Packova M.	31	2013	3.10
19	Forest roads locating based on AHP and COPRAS-G methods: An empirical study based on Iran	Hashemkhani Zolfani S., Rezaeiniya N., Zavadskas E. K., Turskis Z.	31	2011	2.58
20	The relationship among customer satisfaction, loyalty and financial performance of commercial banks	Belas J., Gabcova L.	27	2016	3.86

Source: own

Note: R – rank; TC – total citations; C/Y – citations per year.

four years ago, it has received more than 42 citations, demonstrating the widespread interest in behavioral decision-making.

Another interesting aspect is to consider the countries/regions of the *E&M* publications in order to analyze the geographical distribution characteristics with the highest productivity. Tab. 3 lists the top 10 leading countries/regions, which are mostly from Europe and Asia. The number of publications from the Czech Republic dominated the list by an absolute margin, more than double the number of second-placed Slovakia. Lithuania and Poland finished third and fourth respectively. Apart from TP, the Czech Republic also tops the list in almost all indexes. It should be noted that Iran has achieved remarkable results in terms of TC/TP (14.33), ranking first, indicating the small but refined documents published in *E&M* by the Iranian. Tab. 2 also illustrates the h-index, total publications of corresponding author's countries (TPCA), single country/region production (SCP), and multiple country/region production (MCP) of these producing countries/regions. The statistics of the total number of countries/regions of the publications marked with the corresponding authors are shown in Tab. 3 through the indicator TPCA. Due to the conventions of the *E&M* journal, it is not necessary to label the publications with the corresponding author(s), so some publications are not marked with the corresponding author(s). We have noticed that all the publications from China are marked with the corresponding author(s), which could show the importance of the Chinese academia attached to the labeling of an article with or without corresponding author(s). Then, the MCP and SCP vary depending on whether the corresponding author(s) are from one country or from two or more countries. The publications that could be retrieved with corresponding authors marked are all within the scope of analysis. From the index ratio of SCP and MCP, it can be seen that all publications from Iran that can be retrieved were produced in cooperation with other institutions or countries/regions. Other authors, especially from including China and Lithuania are more willing to cooperate with other countries. Since 2008, authors from 43 countries/regions have published documents in *E&M*, indicating that the international reach of *E&M* is gradually expanding and more countries are enthusiastic to increase their productivity in *E&M*.

2.2 Science Mapping Analysis

The goal of science mapping analysis is to show the structural and dynamic organization of knowledge in scientific research, allowing us to discern the evolutionary finer points. It is a simple method for quickly grasping the frontiers of a field or a journal.

Tab. 3: Top 10 leading countries/regions in *E&M*

R	Country/region	TP	TC	TC/TP	H	25	10	5	1	TPCA	SCP	MCP
1	Czech Republic	435	2,653	6.10	22	13	88	87	138	390	357	33
2	Slovakia	165	1,443	8.75	20	14	35	31	54	130	110	20
3	Lithuania	62	490	7.90	13	3	16	15	21	35	22	13
4	Poland	52	210	4.04	8	1	6	7	27	37	26	11
5	Romania	25	218	8.72	7	2	5	5	12	21	10	11
6	China	21	60	2.86	4	0	2	2	8	21	18	3
7	Slovenia	20	64	3.20	5	0	1	5	10	19	15	4
8	Serbia	19	49	2.58	4	0	1	3	10	18	13	5
9	Iran	15	215	14.33	9	3	5	5	1	12	0	12
10	Spain	14	49	3.50	4	0	1	2	10	12	11	1

Source: own

Note: TP – total publications; TC – total citations; H – h-index, TPCA – total publications of corresponding author's countries; SCP – single country/region production; MCP – multiple country/region production.

The visual analytic approaches can be displayed as a kind of visualized knowledge graph. Simultaneously, the development trend of keywords in documents is an important research issue, and an accurate prediction could assist scholars and journals in determining the direction (Wang et al., 2021). Since the keyword of an article is a generalization that summarizes the issues and preferences covered in the article. Therefore, we lay emphasis on the author's keywords, analyzing their frequency, thematic maps, theme evolution, and collaboration networks.

At first, the 50 most common author's keywords in *E&M* publications were examined by using the word cloud shown in Fig. 8. The occurrence of words is measured by frequency. The word cloud analysis of keywords is a word frequency count of keywords in a collection of related literature. By extracting keywords with high frequency and highlighting them visually, a word cloud is formed, allowing readers to easily comprehend the main elements of textual information. The higher the frequency of the author's keywords, the larger the font in the graph. The word "innovation" is in the center of Fig. 8,

followed by "the European Union" and "Slovakia", which, combined with the above analysis, these two territories are the strongest contributors. Therefore, the background of the research questions in the *E&M* publications is mainly in these two areas. In addition, "competitiveness", "corporate social responsibility" and "management" are also shown to be the main areas of interest. "Regional development" is also a popular topic since the COVID-19 epidemic.

The keywords associated with each cluster could be investigated utilizing the Biblioshiny package to measure the development of research topics and their mutual influence. The strategic diagrams of the author's keywords from *E&M* publications are then divided into four quadrants as shown at the top of Fig. 9. The thematic map demonstrates four different thematic typologies based on two dimensions, including density (vertical axis) and centrality (horizontal axis). Density measures the strength of internal ties among all of the keywords used to describe the research topic. That means that it measures the degree of interaction of a network with other networks, whereas centrality alludes to the strength of external ties to other themes

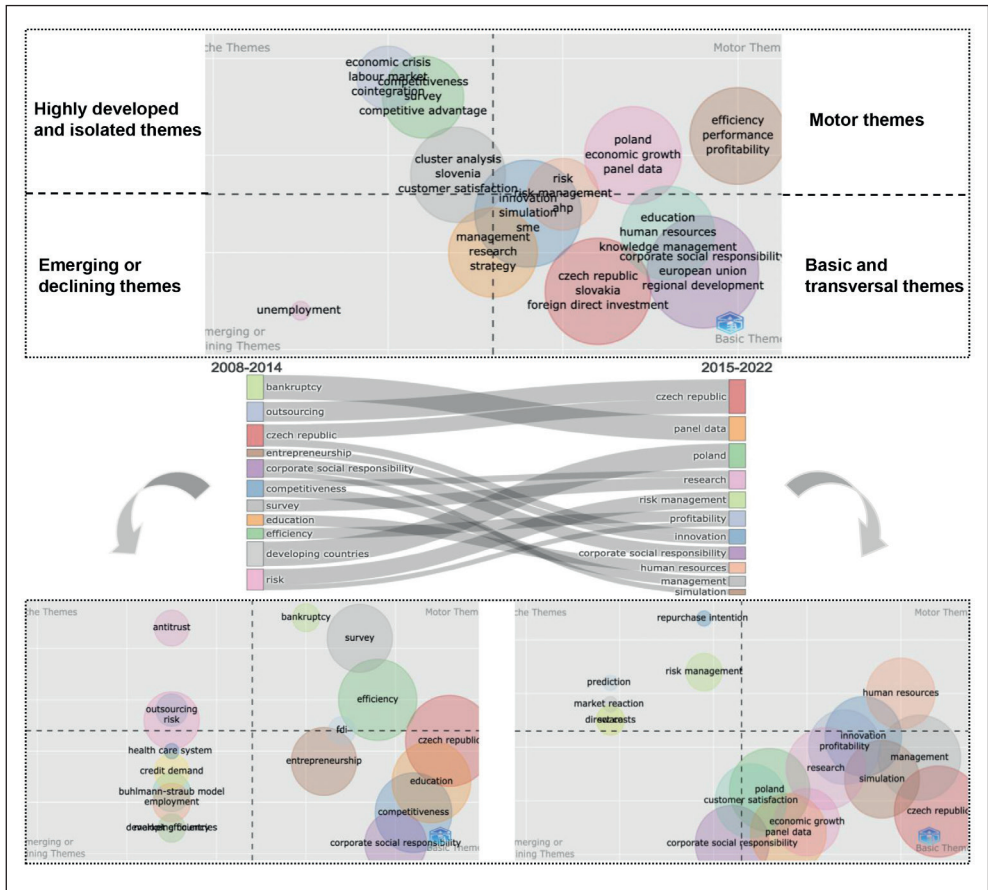**Fig. 8:**   **Word cloud of the author's keywords**

Source: own

through the authors' keyword field, mainly measures the internal strength of the network (Xiao et al., 2022). The first quadrant (Motor themes) refers to important research topics that have gained most attention. It is clear that "economic growth" and "efficiency" are the current academic research hot topics. In the second quadrant (Highly developed and isolated themes), research topics such as "competitiveness" belong to relatively niche research directions but have developed (Tang et al., 2021). The third quadrant's contents (Emerging or declining themes) represent research directions that have recently emerged or are about to disappear. There is also no positive development.

For example, the research of keywords containing "unemployment" is still in its infancy and was an emerging research hotspot during the COVID-19 epidemic. The research topics in the fourth quadrant (Basic and transversal themes) are part of the research field's significant knowledge base.

To analyze the thematic evolution of *E&M* in detail, we perform a time-slice analysis with all *E&M* publications, divided into two-time periods of 2008–2014 and 2015–2022. To begin with, a Sankey diagram is plotted in the middle of Fig. 9. The Sankey diagram is used to show how different themes are connected and developed in the past and present. Each colored

Fig. 9: Thematic evolution of *E&M* publications

Source: own

box in the Sankey diagram represents a theme, and the size of the box is proportional to the frequency of the theme, while streamlines connect the boxes to present the evolutionary trajectory of the theme. The thicker the connecting line is, the higher the linkage between the two themes (Abhishek & Srivastava, 2021). As a whole, it could be found that the themes of *E&M* have become more and more diverse over time, probably because the *E&M* is becoming more influential and more and more scholars from different fields are attracted to the *E&M*. During the period from 2008 to 2014, topics such as "bankruptcy", "entrepreneurship", and "outsourcing" continued to receive attention, and during 2015–2022, the topic of "risk management" became a popular research direction. Then, we draw thematic maps for two time slices, respectively.

At the bottom of Fig. 9, two strategic diagrams of the author's keywords under different periods are elaborated analogously. Thematic analysis can reflect the development of a field and even predict future research trends. Overall, several themes that were in the third quadrant (Emerging or declining themes) during 2008–2014 disappeared during 2015–2022. In the first time slice, the distribution of keywords' themes in these four quadrants is largely even, but during the period 2015–2022, there are significantly fewer keywords in the first and third quadrants and clearer themes in the second quadrant. Most of the themes are biased towards the fourth quadrant, which means that the important but not yet well-developed underlying themes in the field are more popular and of interest to scholars. At this stage, the main research in *E&M* publications is on the use of panel data to solve the problems of economic growth and management innovation in the given country.
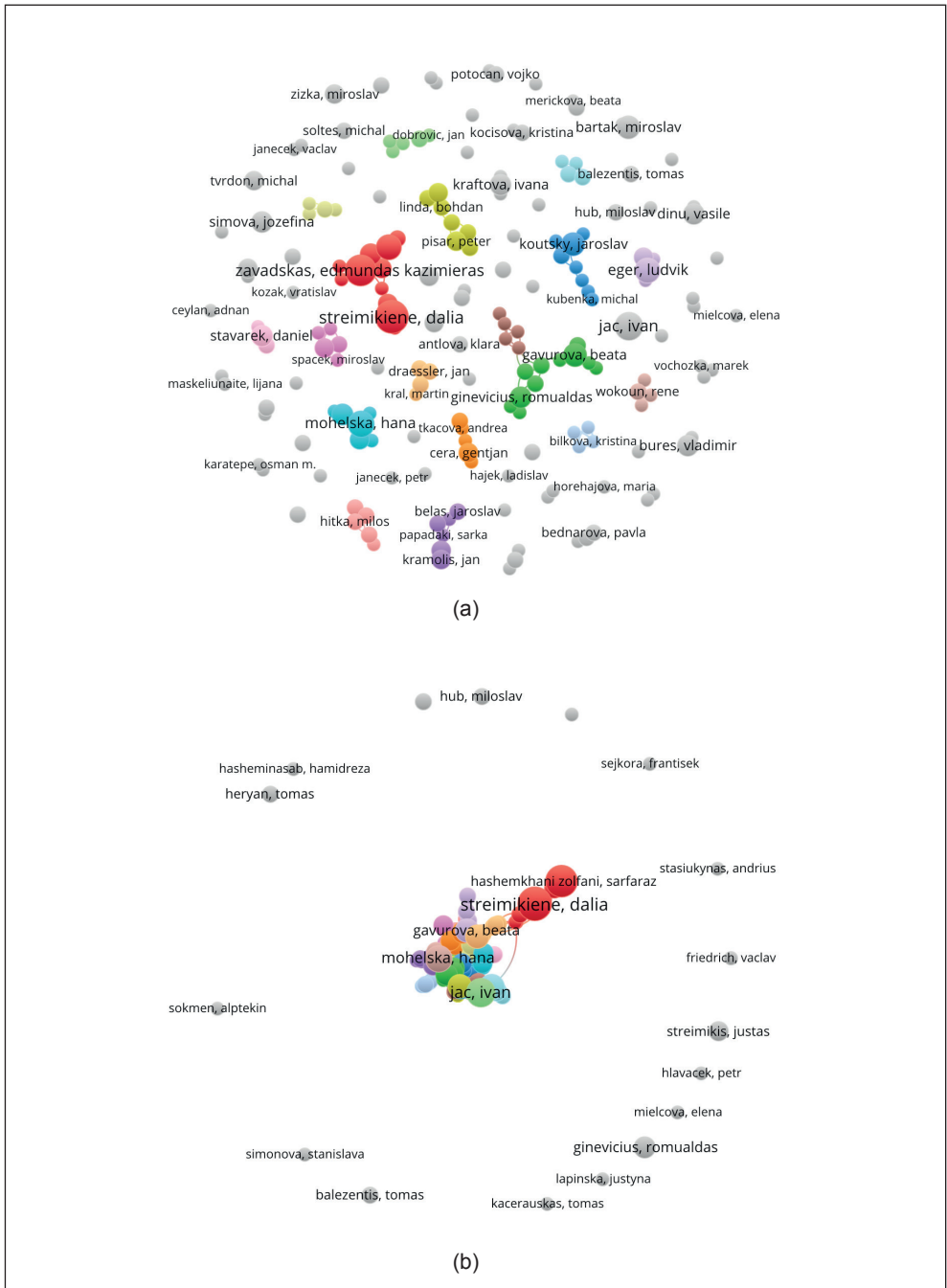
Thematic analysis of keywords from *E&M* publications is helpful to reveal the research hotspots and topics with certain research matters, while collaboration network analysis in bibliometrics can reveal the internal characteristics and intellectual structure of the research. Therefore, we draw an overview of cooperation from three aspects: authors, institutions, and countries/regions.

Next, we visualize the collaborative relationship network between authors who contribute to the publishing of *E&M* by VOSviewer in Fig. 10. Firstly, the co-authorship analysis of authors of *E&M* publications is illustrated in Fig. 10(a).

We set the minimum number of documents of an author as two, and the minimum number of citations of an author as ten, of 1,374 authors in total, 188 authors around the world meet the thresholds, with 145 links and 203 total link strengths. Due to that many of the 188 authors are not connected to each other, they are represented as independent nodes, classified into 81 clusters. Among these authors, Edmundas Kazimieras Zavadskas is the leading author in both local links and link strength, followed by Beata Gavurova, Jaroslav Belas, Zenonas Turskis, and Jaroslav Koutsky. This indicates that Edmundas Kazimieras Zavadskas is behaving well in the collaboration. Interestingly, Jiri Fotr, Emil Vacik, and Kristina Bilkova are not outstanding in terms of TP and TC, but their total link strengths are relatively high, indicating that they mainly published in *E&M* through co-authorship. In terms of citation analysis, we focus on the relationship, structure, and characteristics between the contributors (authors) of the documents by analyzing the cases where two documents are cited by other documents at the same time (Yu et al., 2017). Fig. 10(b) shows the citation analysis map of the authors of the *E&M* publications. Likewise, of 1,374 authors, 188 authors meet the thresholds. 35 clusters have been collected, with 432 links and 512 total link strengths. Beata Gavurova has the most total link strengths (41), nearly twice as strong as the second-place Vincent Soltes, indicating that he is proficient in writing high-quality publications on his own. The larger the circle, the more partners it has. It is clear to see that Hana Mohelska, Ivan Jac, and Dalia Streimikiene have excellent capacities for cooperation.
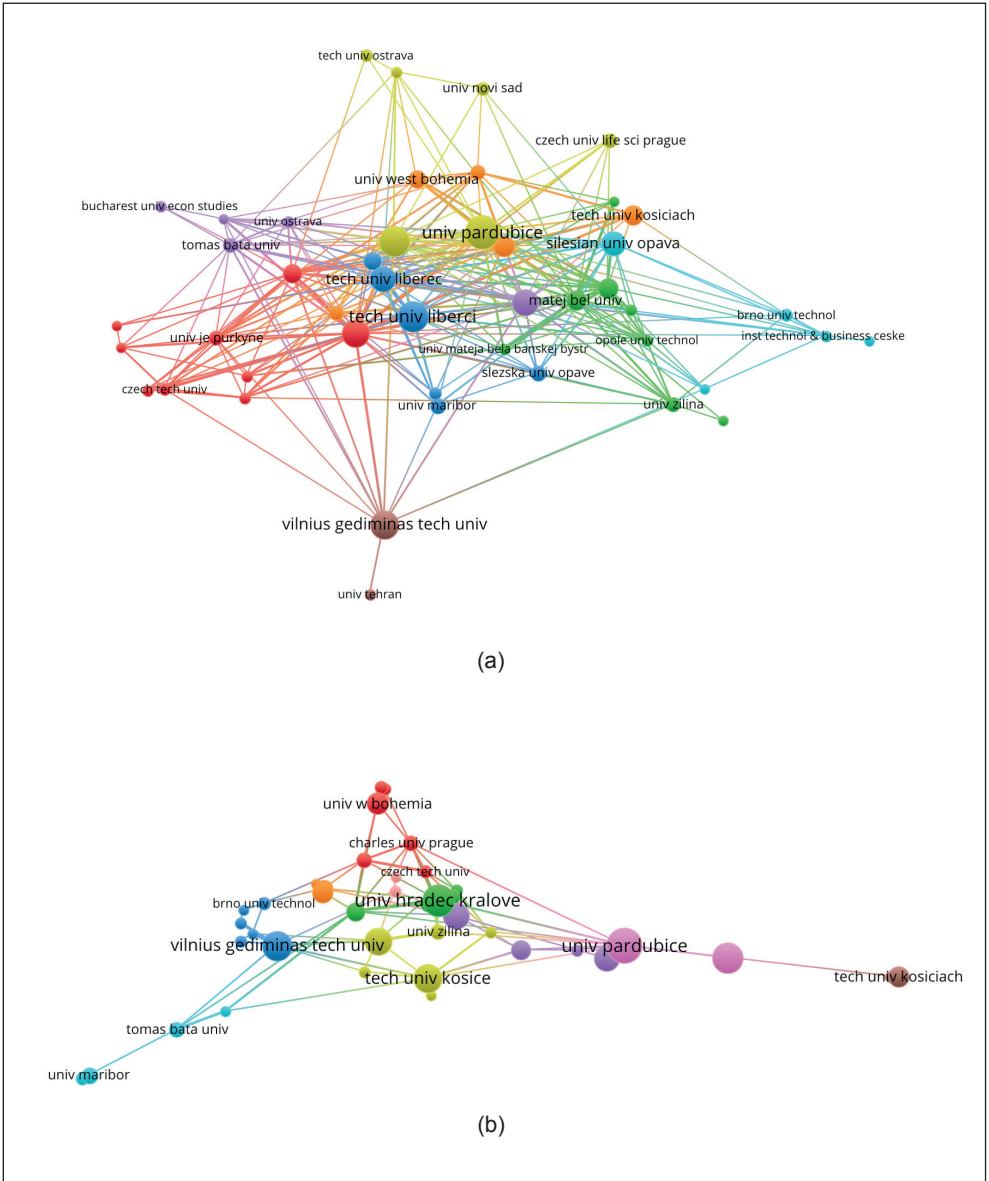
The academic institutions (e.g., universities, colleges, etc.) where the authors of the papers are located are the primary form of organization for conducting scientific research. The institutions with influential and productive authors represent the focus of attention for many scholars in one field (Wang et al., 2020). Fig. 11 shows the collaboration network at the level of institutions. The process of embedding ideas from someone else's paper in your own research article with attribution is called a citation. We do a citation analysis of institutions of the *E&M* publications, and the map is shown in Fig. 11(a). The minimum number of documents of an institution is set as five, and the minimum number of citations of an institution is five. Of 390 institutions, 46 meet the thresholds.

Fig. 10: Collaboration network of authors

(a)

(b)

Source: own
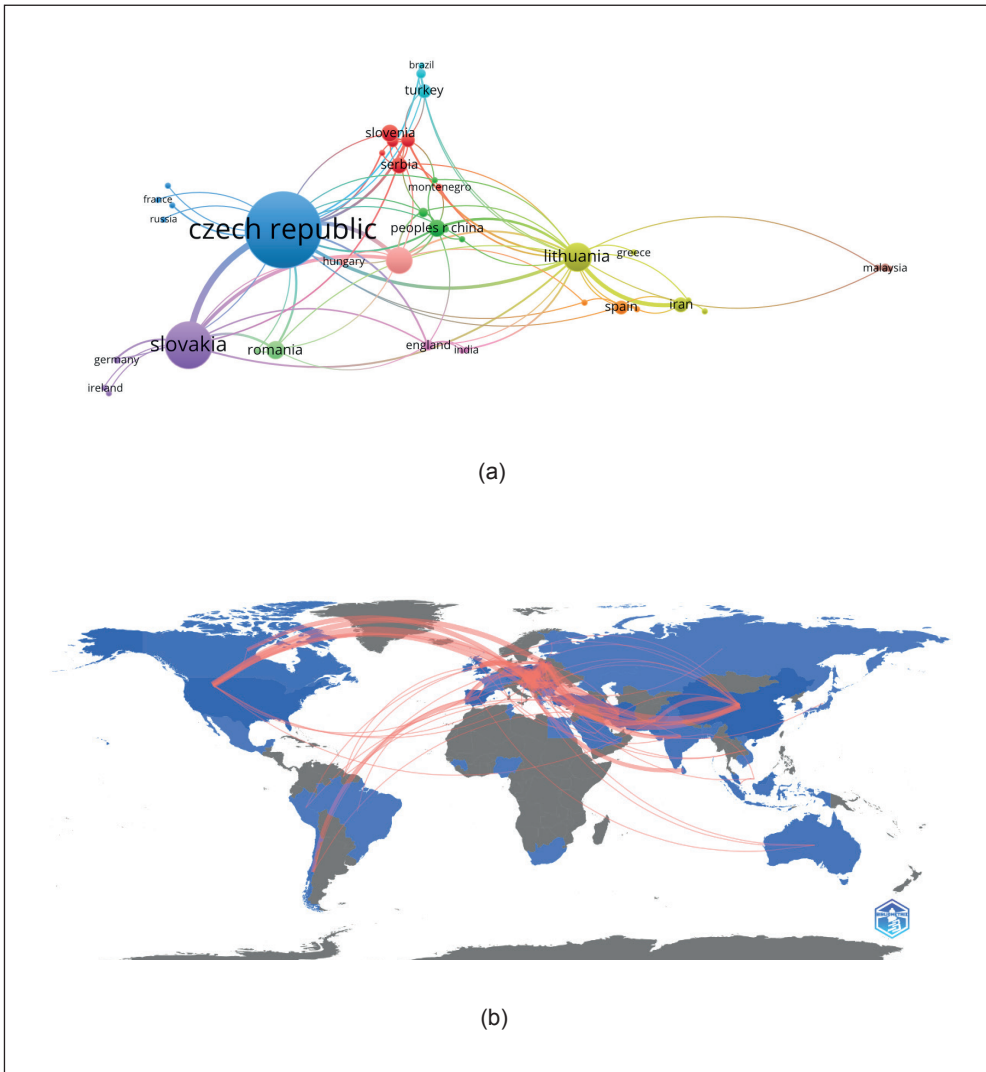
Fig. 11: Collaboration network of institutions

(a)

(b)

The 46 institutions are divided into eight clusters, which are distinguished by eight colors. The size of each node is set as the number of citations per institution. The larger the node, the more citations that institution receives. In addition, the link between two nodes signifies the presence of a connection, and the width of the link represents the link strength, i.e., the

Fig. 12: Collaboration network of countries/regions

(a)

(b)

frequency of cooperation. It is obvious that the Technical University of Liberec, University of Pardubice, the Technical University of Kosice, Vilnius Gediminas Technical University, and Matej Bel University are the main influential institutions with strong total link strengths. Then, we make a co-authorship analysis of institutions. Let the minimum number of documents

of an institution be five, 44 meet the threshold among 390 institutions. Fig. 11(b) shows the co-authorship network at the level of institutions. All institutions are divided into ten colored clusters. The link in Fig. 11(b) represents the number of documents of the institutions. Vilnius Gediminas Technical University received 400 or more citations and 17 link strengths in

total, and acts as the center of the blue cluster. Meanwhile, the University of Hradec Kralove, University of Pardubice, the Technical University of Kosice, the University of West Bohemia, Tomas Bata University, and Czech Technical University also play an important role in the cooperation with the source institutions of the *E&M* publications.

E&M has also a large-scale international collaboration that contributes to global academic exchange. The global collaboration network identifies how countries and regions are related in the journal. The co-authorship analysis of countries/regions is visualized in Fig. 12(a), and the geographic visualization of all countries/regions is shown in Fig. 12(b). There are 55 pairs of countries/regions with tight cooperation according to statistics. The size of the country/region represents the number of its cooperation, the larger the circle in Fig. 12(a), the more partners it has. The thickness of the line indicates how closely the country/region cooperates. The higher the productivity of a country or region, the darker its color, and the connection of pink lines indicate the presence of collaboration in Fig. 12(b). The stronger the line, the higher the collaboration rate (Zheng et al., 2021). It is evident that scholars from the Czech Republic, Slovakia, and Lithuania are fostering strong collaborations and that they are building strong ties with their counterparts around the world. Other countries like Poland, England, Romania, and Spain are also high-productive and close-linked countries. The results of the analysis show that the journal *E&M* has the potential to attract new authors from other countries around the world.

3. Discussions

Based on the above analysis statistics and modeling, this section provides a brief discussion. The descriptive statistics on the main information of the *E&M* publications are shown in Tab. 1. The timespan of these documents is from 2008 to 2022. During this period, the TP each year fluctuated slightly, the average number of citations per document is approximately six, for a total of 23,999 references cited. All documents used for the analysis have 729 articles, with 2,649 keywords given by the authors, and 1,141 Keyword Plus generated.

In terms of author and author collaborations, there are 1,358 distinct authors across all *E&M* publications, and the frequency of occurrence of these authors is 1,864. Of the

817 documents, only 253 were completed independently by a single author. It indicates that 69% of the documents were done by co-authors who may come from different institutions or different countries/regions. The Collaboration Index refers to the average number of authors in a co-authored document, and the collaboration index is measured to be 2.06 in this study, indicating that the average per document published in *E&M* has two authors contributing.

The authors of the journal *E&M* are mainly located in the Czech Republic, Slovakia, Lithuania, Poland, and other countries/regions. Although the journal has been followed by authors from 55 countries, it is a tough challenge to attract more countries or institutions with strong scientific research capabilities to follow this journal in the future. Although the IF of *E&M* has increased by a small margin in recent years, the rating in the SJR category showed a downward trend in 2015. From 2014 to 2017, the classifications of "Business and International Management" and "Economics" still maintained the Q1 level, both classifications have fallen to the Q2 level since 2018, and the category of "Strategy and Management" has dropped to the Q3 level. Finally yet importantly, how to increase the IF of *E&M* while maintaining the TP is another important challenge. In the future, we will consider using natural language processing methods for textual analysis of all *E&M* publications to study thematic changes in a more comprehensive way.

Conclusions

This paper has presented a bibliometric overview and scientific mapping of the *E&M* publications indexed in the Social Sciences Edition of WoS. Based on the use of the bibliometric techniques, we have analyzed the patterns of *E&M* publications, geographic distribution, authors, institutions, international collaboration, document co-citation network, and thematic maps. A detailed visual analysis of the author's keywords of all *E&M* publications is carried out, and the visual graphs obtained by the software are discussed.

The journal *E&M* is celebrating its 25th anniversary in 2023. Research results show that *E&M* publishes a relatively small and stable number of publications per year. The type of publications is dominated by Article since 2015. The journal features theoretical articles as well as application-oriented papers. Occasionally

published review articles summarizing existing knowledge are accepted only if they are based on a systematic literature review. The IF of *E&M* in 2021 is 1.422, and the SJR division is the Q2 level of "Economics, Econometrics and Finance" in 2021. According to statistics, the journal is not very highly cited overall, but more than half of the papers are co-authored, with the majority of publications published by two or three authors. The majority of publications are with authors from one country or institution. The most frequent contributors to *E&M* are authors from European and Asian countries. The Czech Republic occupies an absolute position in the *E&M* journal, followed closely by Slovakia, and the contribution of Lithuania is not to be underestimated. As explored through the evolution of keyword themes, socio-economic growth and business management have become significant research issues in the *E&M*. The research in this paper is helpful for scholars to understand the development and trends of the *E&M*, as well as for editors to grasp the current status of the journal and set goals for the journal's development.

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