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A bibliometric analysis of Economic Research-Ekonomska Istraživanja (2007–2019)

Xinxin Wang[a], Zeshui Xu[a] and Marinko Škare[b]

[a]Business School, Sichuan University, Chengdu, China; [b]Faculty of Economics and Tourism, "Dr Mijo Mirković", Juraj Dobrila University of Pula, Pula, Croatia

ABSTRACT

Economic Research-Ekonomska Istraživanja is an international journal in the research field of business and economics and firstly published in 2007. In this paper, we make a bibliometric analysis of publications in *Economic Research-Ekonomska Istraživanja* from 2007 to 2019. According to Web of Science (WoS), we derive 831 publications in the journal after data pre-processing. First, we explore characteristics of publications and citations based on widely recognised bibliometric indicators. Second, we present the influential countries/regions and influential institutions of publications in the journal. Next, we illustrate science mapping analysis according to two visualisation tools that are VOS viewer and CiteSpace. Specifically, co-citation networks and co-authorship networks are conducted to analyse connection of items. We generate bust detection analysis to identify the emerging cited authors and cited journals. Co-occurrence analysis and timeline view analysis of keywords are developed to detect the hot topics and trend of the journal. Finally, we make some discussions about future challenges of the journal in terms of the above analysis. This paper helps in objectively understanding the development of *Economic Research-Ekonomska Istraživanja* and provides a valuable reference for the scholars in business and economics.

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A1; A2; B4; C0

1. Introduction

Bibliometrics is a scientific research area, and it has attracted more and more attention by the scientific community (Alvarez-Betancourt & Garcia-Silvente, 2014). So far, bibliometric analysis has developed rapidly and applied to many research fields, because it is an effective way to evaluate the merits of a given subject area or a certain journal (Shang et al., 2015). The reason is that bibliometrics is a discipline with the extensive intersection and combination of philology, information science, mathematics and statistics in a specific area (He et al., 2017), and the evolution of a particular research direction can be better revealed by using bibliometric indicators.

CONTACT Zeshui Xu xuzeshui@263.net

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Because of its special advantages, bibliometrics has a wide range of applications in various fields, such as business and economics (Merigo et al., 2016), fuzzy decision making (Liu & Liao, 2017), sustainable energy (Hache & Palle, 2019) and supply chain of renewable energy (Azevedo et al., 2019). Besides, the publications' structure and the development trend of a journal can be explored based on bibliometric analysis, and scholars have preferred to systematically research journals in recent years. For example, the evolution of *Technological and Economic Development of Economy* was developed according to bibliometric analysis (Yu et al., 2019). An overview on the publications of *European Journal of Operational Research* was provided through bibliometric indicators (Laengle et al., 2017). A bibliometric analysis of the documents published in *Information Sciences* was made to celebrate its 50th anniversary (Yu et al., 2017). The structure and citation landscape of *IEEE Transaction on Fuzzy Systems* was explored based on a rigorous analytical approach (Yu et al., 2018). A bibliometric overview of *International Journal of Strategic Property Management* was studied (Zhou et al., 2019), and a bibliometric analysis of *International Journal of Computers Communications and Control* was developed to research the trend (Wang et al., 2019).

Science mapping analysis is one of the most important methods in bibliometrics, because it helps scholars understand research trends greatly and intuitively see the structure and the trend of a research field or a journal (Cobo et al., 2011). For example, a general bibliometric overview of the major scientific developments related to food chemistry was presented on the basis of visualisation (Kamdem et al., 2019), and the evolution of heat integration and heat exchanger network synthesis was studied by VoS viewer (Morar & Agachi, 2010). Up to now, some popular visualisation tools have been used to make science mapping analysis, such as VoS viewer (Stopar & Bartol, 2019), CiteSpace (Chen, 2006) and CitNetExplorer (Eck & Waltman, 2014). In this paper, VoS viewer and CiteSpace are chosen to make a comprehensive and deep analysis of the journal. On the one hand, VoS viewer can present the structure of publications in the journal by co-citation analysis, co-authorship analysis and co-occurrence analysis, etc. Scholars can grasp hot topics and track development trend of the journal by burst detection analysis and timeline analysis in CiteSpace. Since VoS and CiteSpace are convenient to use and produce images intuitively, they have been widely used in many areas, such as computer and information ethics (Heersmink et al., 2011), emergency medicine (Chan & Kuehl, 2019), and information literacy assessment (Pinto, 2015).

Economic Research-Ekonomska Istraživanja is an international journal indexed in the Social Science Citation Index (SSCI) database with an impact factor of 1.381 by Journal Citation Reports (2018), and ranked 160 among 363 journals in the research field of business and economics. The journal supported by the ministry of science and education of the Republic of Croatia, and was launched in 2007. According to the homepage of the journal (https://www.tandfonline.com/toc/rero20/current), it publishes an issue per year, and publishes rigorous scientific papers which contribute significantly to any field of economics-theoretical, applied or empirical. At present, professor Marinko Škare from the Juraj Dobrila University of Pula is the editor of the journal. To date, *Economic Research-Ekonomska Istraživanja* has published over 800

documents with the development of 13 years. Therefore, it is valuable to make a systematic and intuitive analysis of the journal based on bibliometric methods and visualisation tools.

According to general analysis and science mapping analysis, this paper makes a bibliometric analysis of *Economic Research-Ekonomska Istraživanja*. For one thing, readers can evaluate the merits of the journal, and explore the publications' structure and the development trend of the journal. For another, researchers can see the internal network structure intuitively at level of countries/regions, institutions and authors, and grasp hot topics greatly of the journal over time. Since the first paper published in *Economic Research-Ekonomska Istraživanja* in 2007 (Baldarelli et al., 2007), we analyse the journal from 2007 to 2019. In this paper, the contributions lie in the following aspects: (1) Characteristics of publications are provided to describe the development of the journal from three aspects, which are an annual analysis of publications, who is paying attention to the journal, and the most cited publications. (2) Influential countries/regions and institutions of publications in the journal are presented based on some widely recognised bibliometric indictors, such as the total number of publications (TP), the total number of citations (TC), the average number of citations (AC), the percentage of TP (%TP), and H-index (Hirsch, 2005). (3) Science mapping analysis is given through VoS viewer and CiteSpace, including co-citation analysis at the level of reference/source/author, co-authorship analysis of countries/regions and authors, burst detection analysis of cited authors and cited journals, co-occurrence analysis and timeline view analysis of keywords. (4) The future challenges of *Economic Research-Ekonomska Istraživanja* are discussed based on the above analysis. The rest of this paper is organised as follows: Section 2 illustrates the data source and bibliometric methods. In Section 3, we give some results including characteristics of publications, influential countries/regions and institutions, and science mapping analysis. Section 4 provides some discussions about future challenges in the research field. Section 5 ends the paper with the conclusions.

2. Data source and bibliometric methods

Since the first article was published in *Economic Research-Ekonomska Istraživanja* in 2007, we make a bibliometric analysis of the journal from 2007 to 2019. We derived the data from the Web of Sciences (WoS) Core Collection database on December 31, 2019, using the name of the journal. WoS is one of the most widely used databases in academics (Falagas et al., 2008), which is owned by the company Thomson & Reuters Corporation, and provides many leading journals available and detailed information about publications around the world. All publications of the journal from 2007 to December 31, 2019, are exported in plain text format and Comma-Separated Values (CSV) format, which contains bibliographic information, keywords information and citation information, etc. As a result, 831 publications are derived and analysed to provide informative and representative perspectives of the data.

In this paper, some accepted bibliometric indicators by the scientific community are used to evaluate the research's influence and productivity. We use total number of publications (TP), total number of citations (TC), average number of citations per

publication (AC), and H-index. In particular, H-index considers both the number of publications and citations, and it can be applied to authors, countries and institutions. Therefore, H-index without self-citations and the citations without self-citations are considered as two important indicators to express research quality. The rankings may be different because of the specific considered indicator, and scholars may interpret various results depending on their requirements or interests (Hsieh & Chang, 2009).

Two visualisation tools, i.e., CiteSpace and VoS viewer, are used to make science mapping analysis of publications in the journal, because they have powerful user graphic-interface and mapping visualisation capability. To be specific, co-citation analysis of references, sources and authors can identify a research field trend and measure the proximity degree. Co-authorship network analysis shows the number of publications co-authored by at least two countries/regions, institutions, or authors. Co-occurrence analysis of keyword terms represents the number of times that two terms occur together in a set of publications (Kamdem et al., 2019), and timeline analysis shows the developing tendency of the journal during the whole time period. The CiteSpace and the VoS viewer are freely available and are found at: http://cluster.ischool.drexel.edu/~cchen/citespace/download/ and https://www.vosviewer.com/, respectively.

3. Results

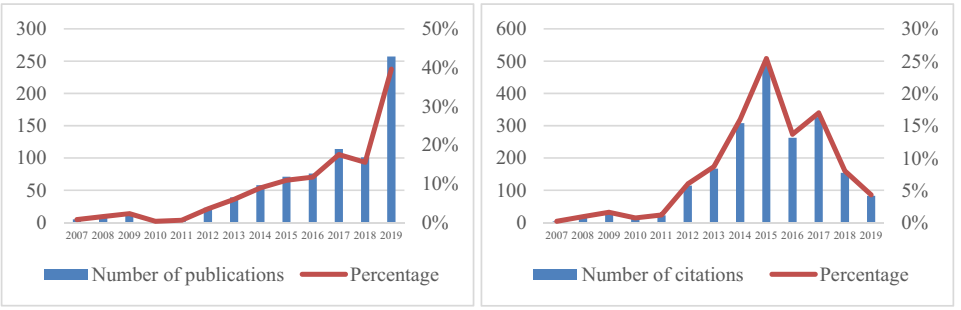
According to the bibliometric analysis of the journal, some results are presented from three aspects, which are characteristics of publications, influential countries/regions and institutions, and science mapping analysis, respectively.

3.1. Characteristics of publications

In this subsection, we investigate characteristics of publications in *Economic Research-Ekonomska Istraživanja* from three angles: annual analysis of publications, who is paying attention to the journal, and the most cited publications, respectively.

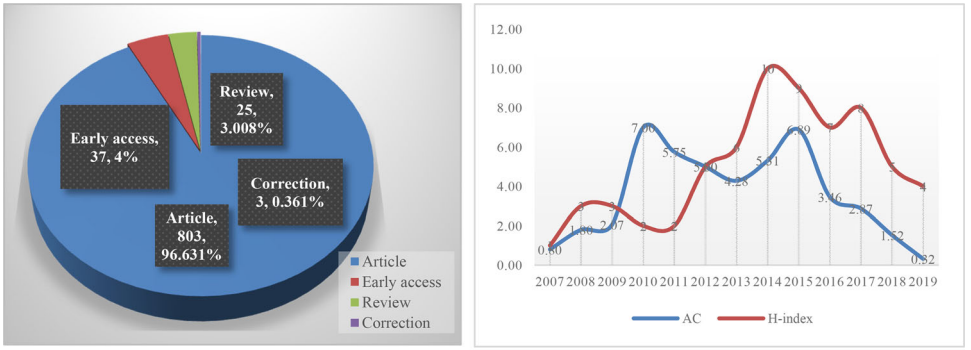
3.1.1. Annual analysis of publications

Figure 1 gives the number of publications and the number of citations distribution in the journal from 2007 to 2019. In Figure 1a, the publication-year distribution shows an increasing trend. To be specific, the annual publication was less than 20 in the first five years from 2007. Since 2012, the number of publications has been increasing steadily, and the annual publications are greater than 100 from 2017 to 2019. The number of publications increased significantly in 2019, which shows that more and more researchers have paid attention to the journal. Figure 1b shows the citation-year distribution. The publications receive the most citations (489) in 2015, followed by 327 citations in 2017, and 308 citations in 2014. The trend of citations had been increasing from 2007 to 2015. Besides, the falloff of citations since 2017 does not imply that no excellent contributions appeared, but that it always needs time for publications to be widely recognised and cited (Pilkington & Meredith, 2009).



(a) The publication-year distribution. (b) The citation-year distribution.

Figure 1. The number of publications and citations distribution. (a) The publication-year distribution. (b) The citation-year distribution.



(a) Publication type distribution. (b) The AC and H-index of publications.

Figure 2. The distribution of type, AC and H-index about publications. (a) Publication type distribution. (b) The AC and H-index of publications.

There are 4 types of publications in the journal during the last 13 years, shown in Figure 2 (a). Specifically, 803 articles with 96.631% occupies a comparatively great proportion of all publications, followed by 37 early access papers with 4%, 25 reviews with 3.008%, and 3 corrections with 0.361%. In terms of the indicator AC, there are two peaks from 2007 to 2019. One revived 7 ACs in 2010, the other had a 6.89 ACs in 2015. According to H-index of publications, the highest H-index is 10 in 2014, followed by 9 in 2015 and 8 in 2017, shown in Figure 2b. The trends of AC and H-index are the same except for 2010, 2011, 2012 and 2013.

We summarise the annual characteristics of publications in the journal from 2007 to 2019 in Table 1. Except for some common indicators, like TP, TC, AC and H-index, other evaluation indicators are also used to describe the characteristics of publications, such as the number of non-international cooperation (NNIC), the number of international cooperation (NIC), the number of a single institution (NSI), the number of multiple institution cooperation (NMIC), the number of a single author (NSA) and the number of multiple authors (NMA). Some publications in WoS do not have the corresponding information about authors, such as affiliated addresses,

Table 1. Annual characteristics of publications from 2007 to 2019.

Year	TP	TC	AC	NNIC	NIC	NSI	NMIC	NSA	NMA	H-index
2007	5	4	0.80	3	0	2	1	1	4	1
2008	10	18	1.80	4	0	2	2	1	9	3
2009	15	31	2.07	12	2	7	7	5	10	3
2010	2	14	**7.00**	2	0	1	1	1	1	2
2011	4	23	5.75	3	0	1	2	1	3	2
2012	23	115	5.00	18	3	13	8	5	18	5
2013	39	167	4.28	35	2	22	15	13	26	6
2014	58	308	5.31	45	13	30	28	10	48	**10**
2015	71	**489**	6.89	57	14	26	45	8	63	9
2016	76	263	3.46	63	13	33	43	11	65	7
2017	114	327	2.87	82	31	42	71	22	92	8
2018	101	154	1.52	76	25	39	62	16	85	5
2019	**257**	83	0.32	**201**	**56**	**107**	**150**	**39**	**218**	4

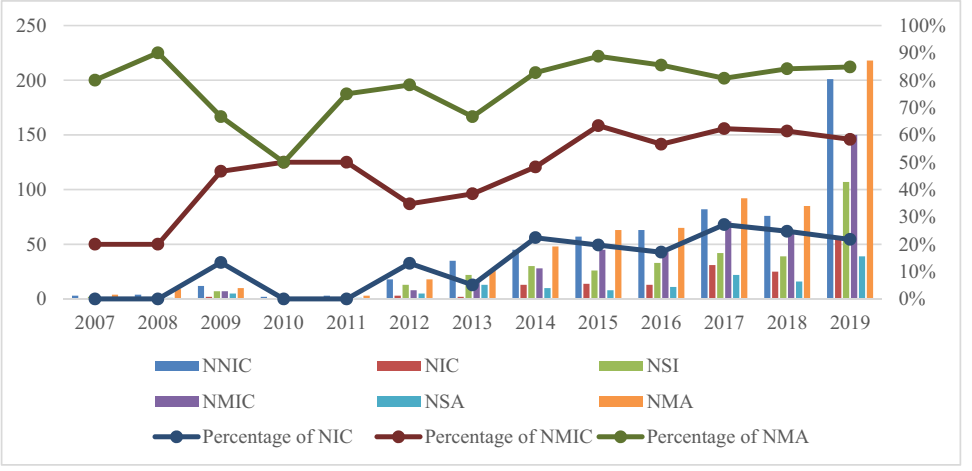


Figure 3. The information of cooperation among countries/regions, institutions and authors in publications.

institutions and countries. In this paper, we ignore these publications when calculating NNIC, NIC, NSI and NMIC.

In Table 1, we highlight the maximum value of each indicator in bold. The most TP (257), the most TC (489), the most AC (7) and the most H-index (10) are in 2019, 2015, 2010 and 2014, respectively. Considering the situation of international cooperation, NNIC is always greater than NIC during each year, and the most NIC is in 2019, which shows that it is the trend to finish papers by international cooperation. As far as institution cooperation is concerned, NMIC has been greater than NSI since 2015, and the most NMIC is in 2019, which represents that the cooperation among institutions has received more and more attention in the journal. According to the number of authors, NMA has always been no less than NSA since 2007, and NMA has been substantially greater than NSA in many years.

Figure 3 shows the change trends of six indicators, and the percentages of NIC, NMIC, and NMA. The development of publications in the journal is not stable in the first five years, while six indicators have presented overall increasing trends since 2012. Specifically, the percentage of NIC and the percentage of NMIC increased from

Table 2. Top 10 Countries/regions/institutions/authors citing publications in the journal.

Rank	Country/Region	TP	Institution	TP	Author	TP
1	Croatia	156	University of Zagreb	70	Zavadskas, E. K.	19
2	China	94	University of Ljubljana	42	Streimikiene, D.	10
3	Slovenia	75	Juraj Dobrila University of Pula	40	Su, C. W.	8
4	Turkey	70	Vilnius Gediminas Technical University	37	Mirza, N.	7
5	Romania	64	University of Rijeka	27	Skare, M.	6
6	Poland	57	University of Primorska	26	Vveinhardt, J.	6
7	Lithuania	55	University of Novi Sad	24	Tao, R.	6
8	Serbia	54	University of Split	22	Afsar, B.	5
9	Spain	51	Institution of Economics Zagreb Eiz	20	Chen, Y. H.	5
10	Pakistan	40	University of Rijeka Faculty of Economics Business	20	Nie, P. Y.	5

0% and 20% in 2007 to 22% and 58% in 2019 with fluctuations, respectively. Besides, over 80% publications in the journal are multiple authors since 2014. Therefore, the cooperation among countries/regions, institutions and authors in *Economic Research-Ekonomska Istraživanja* has become increasingly remarkable and important.

3.1.2. Who is paying attention to the journal?

Economic Research-Ekonomska Istraživanja is an international journal in business and economics. Many scholars have paid attention to the journal around the world. Considering countries/regions, institutions and authors, we make a summary to understand top 10 sources citing more publications in the journal, shown in Table 2.

In terms of countries/regions, the scholars in Croatia have cited the most publications (156) in *Economic Research-Ekonomska Istraživanja*, followed by China (94), Slovenia (75) and Turkey (70), respectively. As far as an institution is concerned, University of Zagreb from Croatia cites 70 citing publications and it ranks the first, followed by the University of Ljubljana from Slovenia (42), Juraj Dobrila University of Pula from Croatia (40), and Vilnius Gediminas Technical University from Lithuania (37), respectively. In the top 10 institutions, six institutions are from Croatia, two institutions are from Slovenia, and Lithuania, respectively, and Serbia has one institution. On the author's side, Zavadskas, E. K. and Streimikiene, D. both from Lithuania rank the first and the second with 19 publications and 10 publications, respectively. Therefore, the publications in *Economic Research-Ekonomska Istraživanja* have aroused special attention for scholars in Croatia, Lithuania and Slovenia.

3.1.3. The most cited publications

Since *Economic Research-Ekonomska Istraživanja* published papers, some publications impact the field of business and economic. Table 3 shows the information of top 10 cited publications, including type, year, citation, CA, institution number (IN) and country/region number (CN).

In Table 3, 6 publications are articles and 4 publications are reviewed. The top 3 cited publications are all reviews (Mardani et al., 2015; Zavadskas et al., 2016; Keshavarz Ghorabaee et al., 2017), and the research contents are all about decision making, which has been widely studied from basic theory and practical application (Wang et al., 2019). The most cited publication is a review of the literature from

Table 3. The information of top 10 cited publications.

Rank	Title	Type	Year	Citation	CA	IN	CN
1	Multiple criteria decision-making techniques and their applications - a review of the literature from 2000 to 2014	Review	2015	225	37.50	2	1
2	Hybrid multiple criteria decision-making methods: a review of applications for sustainability issues	Review	2016	67	13.40	2	2
3	Supplier evaluation and selection in fuzzy environments: a review of MADM approaches	Review	2017	57	14.25	2	2
4	Design of products with both international and local perspectives based on Yin-Yang balance theory and SWARA method	Review	2013	49	6.13	4	2
5	Environmental impact assessment based on group decision-making methods in mining projects	Article	2014	46	6.57	4	2
6	Planning horizon in labour supply of Belarusian small entrepreneurs	Article	2015	40	6.67	3	2
7	Risk analysis of critical infrastructures using fuzzy copras	Article	2011	36	3.60	3	2
8	The price prediction for the energy market based on a new method	Article	2018	34	11.33	3	1
9	Sustainable tourism: a comprehensive literature review on frameworks and applications	Article	2015	34	5.67	4	2
10	Are some cultures more favourable for social entrepreneurship than others	Article	2017	30	3.33	2	2

2000 to 2014 about multiple criteria decision-making techniques and their applications. Decision making is the part of real life, and it has played more and more important role under complex and uncertain environment. From the perspectives of economic prediction, economic decision may be a valuable research direction with higher mathematical theory to economic field. Besides, more than half of publications are multiple institutions and multiple countries/regions. Specifically, 4 publications have two institutions, and 3 publications have three and four institutions, respectively. 80% of highly cited publications are international cooperation. Therefore, the cooperation of institutions and countries/regions is important to make the highly cited publications.

3.2. Influential countries/regions and institutions

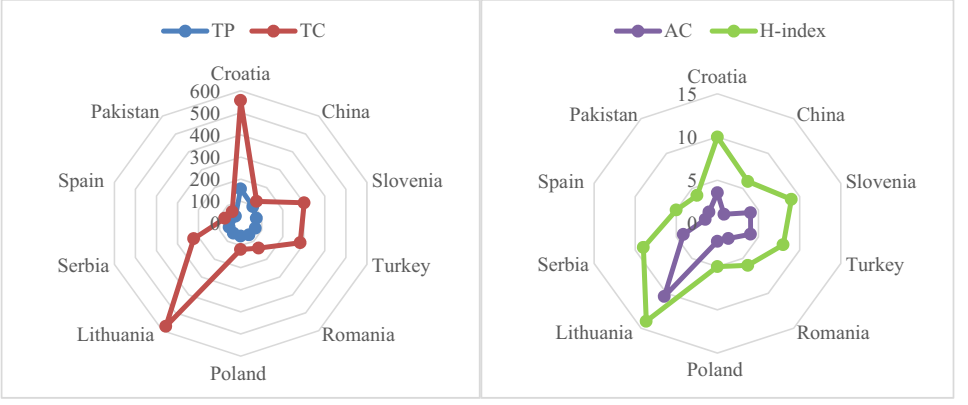
In this subsection, influential countries/regions and institutions about publications in *Economic Research-Ekonomska Istraživanja* are obtained by some evaluation indicators, which are TP, TC, AC, the numbers of citations no less than 30/20/10/5, %TP, and H-index.

3.2.1. The most productive countries/regions

Table 4 shows the top 10 productive countries/regions of publications in the journal, and they also highlight the maximum value of each indicator in bold. According to TP and %TP, Croatia ranks the first, followed by China and Slovenia. Lithuania is the most TC and the highest H-index country with 575 and 14, respectively, followed by Croatia (556; 10) and Slovenia (302; 9). Lithuania is also the most AC country with 10.45, and the numbers of citations no less than 30/20/15 all rank the first, which denotes that the publications in the journal from Lithuania have received the highest recognition.

Table 4. The top 10 productive countries/regions of publications.

Rank	Country	TP	TC	AC	≥30	≥20	≥10	≥5	%TP	H-index
1	Croatia	**156**	556	3.56	1	4	11	**36**	**18.77%**	10
2	China	94	123	1.31	0	0	2	9	11.31%	6
3	Slovenia	75	302	4.03	0	2	9	23	9.03%	9
4	Turkey	70	283	4.04	1	2	6	22	8.42%	8
5	Romania	64	138	2.16	0	0	2	10	7.70%	6
6	Poland	57	118	2.07	1	1	2	6	6.86%	5
7	Lithuania	55	**575**	**10.45**	**7**	**11**	**15**	25	6.62%	**14**
8	Serbia	54	223	4.13	0	1	8	19	6.50%	9
9	Spain	51	75	1.47	0	0	2	6	6.14%	5
10	Pakistan	40	65	1.63	0	0	0	4	4.81%	4



(a) Radar map with TP and TC.

(b) Radar map with AC and H-index.

Figure 4. The radar map of top 10 productive countries/regions in terms of TP, TC, AC and H-index. (a) Radar map with TP and TC. (b) Radar map with AC and H-index.

In terms of TP, TC, AC and H-index, the radar map of top 10 productive countries/regions is shown in Figure 4. As far as TP and TC are concerned in Figure 4a, Croatia and Lithuania are prominent, and the gap of TC is wider than the gap of TP among top 10 countries/regions. According to AC and H-index in Figure 4b, Lithuania both does well, and secondly are Croatia and Serbia. The structure of AC and H-index is similar among top 10 countries/regions.

We distribute the authors of publications in the journal around the world, and the global geographic distribution of publications covers about 68 countries/regions, shown in Figure 5. The redder the colour in the map, the more publications form the countries/regions. As we can see, the productive countries/regions are mainly from Europe and East Asia.

Figure 6 presents the cumulative percentage of publications with top 30 countries/regions, and the logarithmic trend line is $y = 0.2582 \ln(x) + 0.0743$ with $R^2 = 0.9862$. To be specific, the publications in the journal from the top 10 countries/regions have contributed to 68.81%, and the publications from the top 20 and the top 30 have contributed to 88% and 94.68%, respectively.

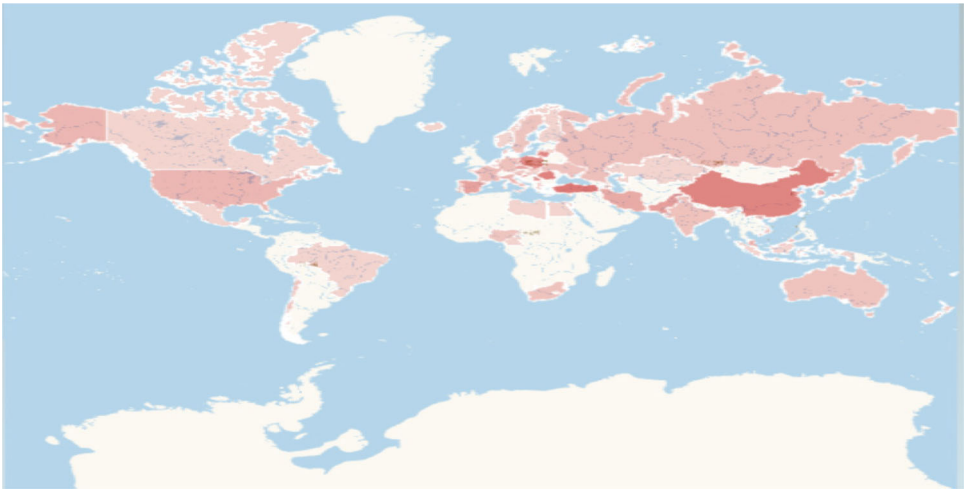


Figure 5. Global geographic distribution of publications.

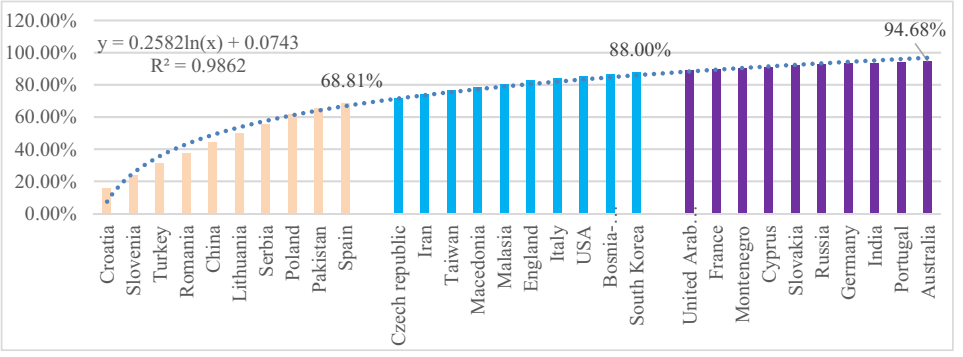


Figure 6. Cumulative percentage of publications with top 30 countries/regions.

3.2.2. The most productive institutions

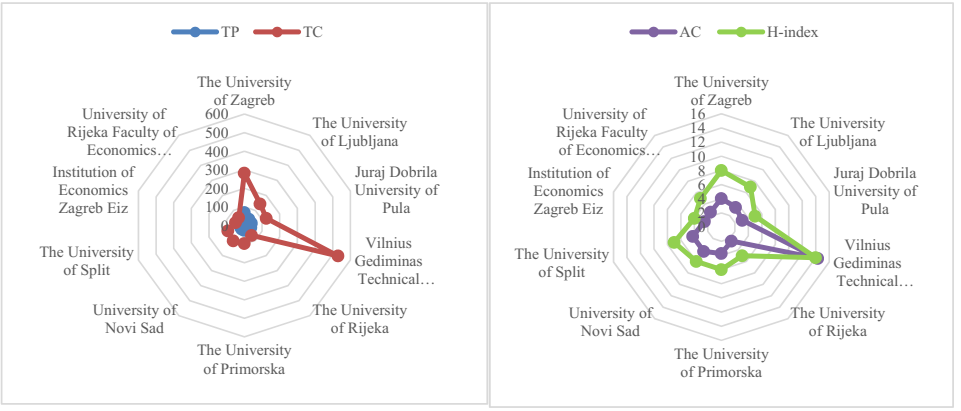
Similarly, we also investigate the most productive institutions among totally 665 institutions in the journal, and we list the information of top 10 productive institutions in Table 5.

The University of Zagreb (Croatia) is the most productive institution in terms of TP and %TP, followed by the University of Ljubljana (Slovenia) and Juraj Dobrila University of Pula (Croatia). Six of the top 10 productive institutions are from Croatia, which shows that the institutions in Croatia have a strong interest in *Economic Research-Ekonomska Istraživanja*. Vilnius Gediminas Technical University (Lithuania) is the most influential institution according to TC, AC, the numbers of citations no less than 30/20/10/5 and H-index, which represents that the publications of the institution in the journal have in-depth research and wide recognition.

Figure 7 shows the radar map of the top 10 productive institutions. In Figure 7a, the number of TP has a little difference among top 10 institutions, while the gap is bigger about the number of TC, and Vilnius Gediminas Technical University

Table 5. The top 10 productive institutions in publications.

Rank	Institution	Country	TP	TC	AC	≥30	≥20	≥10	≥5	%TP	H-index
1	The University of Zagreb	Croatia	**70**	282	4.03	0	2	6	19	**8.42%**	8
2	The University of Ljubljana	Slovenia	42	144	3.43	0	1	4	11	5.05%	7
3	Juraj Dobrila University of Pula	Croatia	40	124	3.10	0	1	3	8	4.81%	5
4	Vilnius Gediminas Technical University	Lithuania	37	**530**	**14.32**	**7**	**11**	**15**	**20**	4.45%	**14**
5	The University of Rijeka	Croatia	27	66	2.44	0	0	0	5	3.25%	5
6	The University of Primorska	Slovenia	26	97	3.73	0	0	3	11	3.13%	6
7	University of Novi Sad	Serbia	24	102	4.25	0	0	4	9	2.89%	6
8	The University of Split	Croatia	22	93	4.23	0	1	2	7	2.65%	7
9	Institution of Economics Zagreb Eiz	Croatia	20	50	2.50	0	0	1	3	2.41%	4
10	University of Rijeka Faculty of Economics Business	Croatia	20	52	2.60	0	0	0	5	2.41%	5



(a) Radar map with TP and TC.

(b) Radar map with AC and H-index.

Figure 7. The radar map of top 10 productive institutions in terms of TP, TC, AC and H-index. (a) Radar map with TP and TC. (b) Radar map with AC and H-index.

(Lithuania) performs well in terms of TC, followed by the University of Zagreb (Croatia). In Figure 7b, except for Vilnius Gediminas Technical University (Lithuania), there are a little difference about AC and H-index among other top 9 institutions.

3.3. Science mapping analysis

In this section, we make science mapping analysis of publications in *Economic Research-Ekonomska Istraživanja* by VoS viewer and CiteSpace from four aspects, i.e., co-citation analysis, co-authorship analysis, burst detection analysis, and co-occurrence analysis and timeline view analysis.

3.3.1. Co-citation analysis

Considering the cited references/sources/authors by publications in *Economic Research-Ekonomska Istraživanja*, co-citation networks are illustrated and analysed.

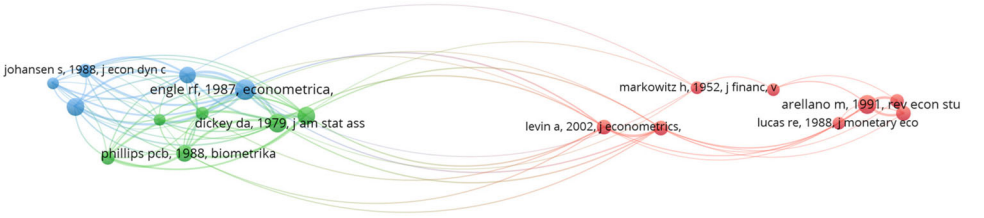
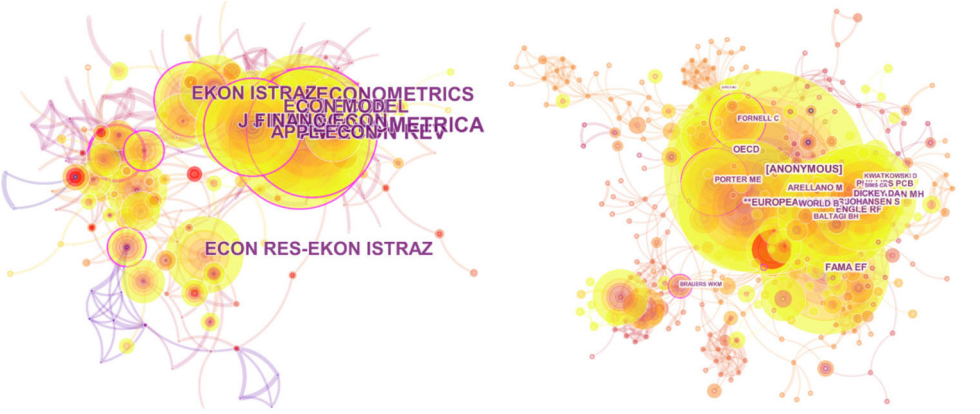


Figure 8. The reference co-citation network by publications in the journal.



(a) The source co-citation network. (b) The author co-citation network.

Figure 9. The source and author co-citation networks of publications. (a) The source co-citation network. (b) The author co-citation network.

According to the visualisation tool VOS viewer, the reference co-citation network by publications is shown in Figure 8. We set the minimum number of citations as 10 to see. As a result, 26 references meet the threshold among totally 26,289 references.

In Figure 8, a node shows a reference, and the size of the node means the total number of citations with which we cite the reference. A link between two nodes represents a co-citation relationship, and the thicker the link is, the more citations the reference has. The place of the nodes and the colours are used to cluster the items, and there are three clusters from the perspective of three colours. The top cited we label references with the first author, year and journal.

Figure 9 shows the source and author co-citation networks by publications in the journal by CiteSpace. There are 10,934 nodes and 84,235 edges in Figure 9a, and 19,241 nodes and 117,824 edges in Figure 9b. The nodes represent the cited sources/authors by publications in the journal where the size and the colour of the node mean that the scope and the citation of the source/author. To be specific, the bigger the node is, the broader the source/author is, and the deeper the colour is, the more citations the source/author has. Therefore, some large-sized nodes highlighted in Figure 9 mean the top cited sources/authors by publications in *Economic Research-Ekonomska Istraživanja*.

Table 6 lists the information of top 10 cited references/sources/authors by publications in the journal. More than half of top 10 references are before 2000, and the first

Table 6. Top 10 cited references/sources/authors by publications in the journal.

Rank	Reference	TC	Source	TC	Author	TC
1	Engle (1987)	33	*J. Financ.*	335	European Commission	89
2	Dickey (1979)	26	*J. Financ. Econ.*	294	Zavadskas, E. K.	86
3	Arellano (1991)	24	*Am. Econ. Rev.*	287	Fame E. F.	80
4	Dickey (1981)	24	*Econometrica*	252	Oecd	60
5	Pesaran (2001)	24	*J. Bank Financ.*	215	Pesaran M. H.	58
6	Johansen (1990)	23	*J. Econometrics*	207	Johansen S.	56
7	Phillips (1988)	21	*Eur. J. Oper. Res.*	204	Engle R. F.	50
8	Fornell (1981)	17	*Expert Syst. Appl.*	201	Saaty T. L.	48
9	Levin (2002)	16	*Tourism Manage.*	177	Dickey D. A.	47
10	Blundell (1998)	16	*J. Marketing*	163	Eurostat	43

cited reference is from 1987 by Engle. J. Financ. ranks the first cited source with 335 citations, followed by J. Financ. Econ. (294) and Am. Econ. Rev. (287), respectively. In terms of cited authors, European Commission receives the most citations with 89, followed by Zavadskas, E. K. (86) from Lithuania, and Fame E. F. (80) from USA, respectively.

3.3.2. Co-authorship analysis

To describe the collaboration relationship of publications in *Economic Research-Ekonomska Istraživanja* from 2007 to 2019, we make co-authorship analysis by VoS viewer at the level of country/region and author.

When the minimum numbers of publications and citations are 1 and 0, respectively, there are 68 countries/regions of publications in the journal, and the co-authorship network of countries/regions is shown in Figure 10. According to various colours, there are totally 11 clusters, and the most prominent countries of each cluster are Croatia, Turkey, Serbia, China, Romania, Lithuania, Pakistan, Spain, Iran, Malaysia and Egypt, respectively. Besides, countries/regions in same colour show that they are in the same cluster and may have more cooperation with each other. For example, Croatia, Slovenia and Poland prefer to cooperate each other in blue cluster, and China, England and Taiwan have more cooperation in red cluster.

Similarly, the minimum numbers of publications and citations are also set as 1 and 0, respectively, 1,462 authors of publications in the journal are derived. Figure 11 shows the co-authorship network of authors, and there are 10 clusters because of ten colours. As we can see, some authors interweave with each other, and Zavadskas, E. K. (Lithuania), Podvezko, V. (Lithuania), Turskis, Z. (Lithuania), Antucheviciene J. (Lithuania), Yazdani-Chamzini, A. (Iran), Saparauskas, J. (Lithuania), Kosareva, N. (Lithuania), Bahrami. M (USA), Matic B. (Serbia) and Shen, K. Y. (Taiwan) perform well in their clusters. In addition, more than half of prominent authors are from Lithuania, which shows that the authors from Lithuania have made great contributions to *Economic Research-Ekonomska Istraživanja*.

3.3.3. Burst detection analysis

To reflect the dynamic changes and the surging frequency of citations of publications in *Economic Research-Ekonomska Istraživanja* during a certain period, citation burst detection analysis is used to reflect the emerging trends that attracted attention by the academic.

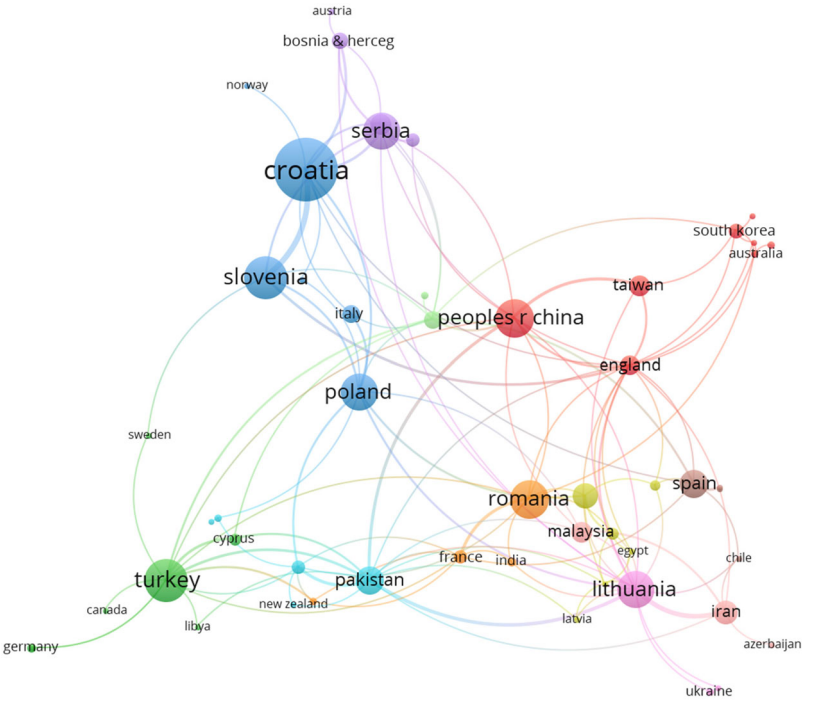


Figure 10. Co-authorship network of countries/regions.

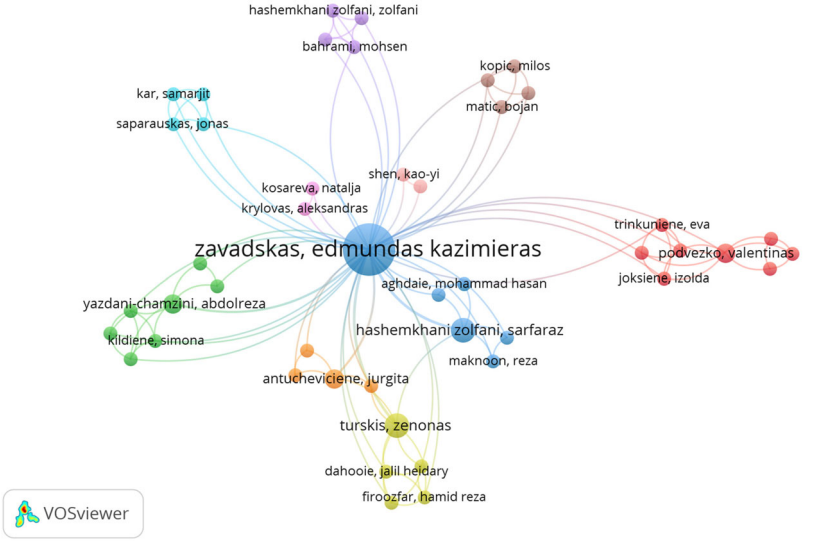


Figure 11. Co-authorship network of authors.

Table 7 lists the top 6 cited authors of publications in the journal with the strongest citation bursts. PHILLIPS P.C.B. on the top of the list with the maximum burst strength of 3.4003. Five authors (PHILLIPS P.C.B., NARAYAN P.K., LEE C.C., SHAHBAZ M. and JENSEN M.C.) have the longest citation burst duration with

Table 7. Top 6 cited authors with the strongest citation bursts.

Rank	Cited Authors	Year	Strength	Begin	End	2007-2019
1	PHILLIPS P.C.B.	2007	3.4003	2012	2014	
2	NARAYAN P.K.	2007	3.3061	2017	2019	
3	LEE C.C.	2007	2.9535	2017	2019	
4	SHAHBAZ M.	2007	2.9535	2017	2019	
5	JENSEN M.C.	2007	2.7822	2017	2019	
6	GINEVICIUS R.	2007	2.721	2014	2015	

Table 8. Top 10 cited journals with the strongest citation bursts.

Rank	Cited Journals	Year	Strength	Begin	End	2007-2019
1	J. MONEY CREDIT BANK	2007	6.0297	2013	2016	
2	WORKING PAPER SERIES	2007	5.7405	2013	2016	
3	AMFITEATRU ECON.	2007	5.4816	2013	2015	
4	EKONOMSKI PREGLED	2007	4.9388	2009	2014	
5	BIOMETRIKA	2007	4.0671	2012	2013	
6	J. RETAILING	2007	4.0231	2012	2014	
7	J. MARKETING	2007	3.9257	2008	2012	
8	INZ. EKON.	2007	3.7894	2013	2015	
9	J. AM. STAT. ASSOC.	2007	3.7384	2012	2017	
10	MANAGE DECIS.	2007	2.8405	2010	2016	

3 years, which shows that their work has made a far-reaching impact. Besides, the citation bursts of four authors (NARAYAN P.K., LEE C.C., SHAHBAZ M. and JENSEN M.C.) are the closest to the present (from 2017 to 2019), which represents that their work may have formed a popular and hot topic.

Similarly, Table 8 lists the top 10 cited journals with the strongest citation bursts from 2007 to 2019. *J. MONEY CREDIT BANK* has the strongest strength with the value of 6.0297. It is a primary economics journal reporting major findings in the study of monetary and fiscal policy, credit markets, money and banking, portfolio management, and related subjects. The citation burst of the cited journal of *MANAGE DECIS* had the longest duration with 7 years from 2010 to 2016. *J. MARKETING* started the earliest from 2008, which illustrates that the publications in *Economic Research-Ekonomska Istraživanja* cited it earlier and explosively.

3.3.4. Co-occurrence analysis and timeline view analysis

To understand the research topics of publications in *Economic Research-Ekonomska Istraživanja*, co-occurrence analysis of keywords is an effective and important tool to support knowledge mining and provide a view of the knowledge structure and research trend.

There are 3,594 keywords of publications in the journal from 2007 to 2019 using VoS viewer, and 197 keywords meet the threshold that we set the minimum number of occurrences of a keyword as 5. Figure 12 shows the keyword co-occurrence network of publications. A node represents a keyword, and the bigger the node is, the more citations the keyword has. A link between two nodes means the co-occurrence of two keywords, and the thicker the line is, the more co-occurred times they have. Similarly, a colour represents a cluster, and there are 6 clusters in Figure 12. To be specific, 'performance', 'impact' and 'innovation' are prominent in red cluster; 'management', 'selection' and 'efficiency' highlight in purple cluster; 'Croatia',

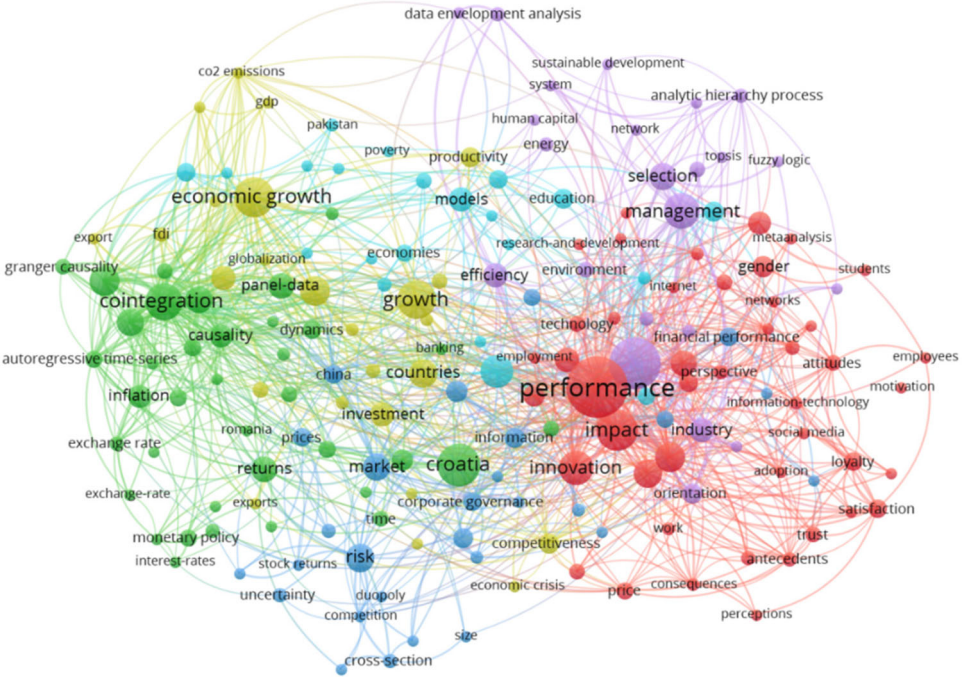


Figure 12. The keyword co-occurrence network of publications.

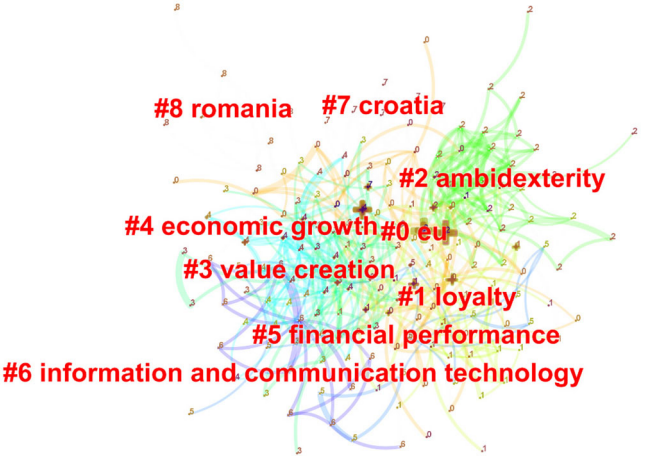


Figure 13. The keyword clusters visualisations.

'cointegration' and 'panel-data' are included in green cluster; 'market' and 'risk' are labelled in blue cluster; 'economic growth' and 'growth' are prominent in yellow cluster; 'models' and 'education' are included in light blue cluster.

Figure 13 shows the keyword clusters visualisations by CiteSpace. 9 clusters are summarised among all keywords of publications in *Economic Research-Ekonomska Istraživanja*, which are 'EU', 'loyalty', 'ambidexterity', 'value creation', 'economic growth', 'financial performance', 'information and communication technology', 'Croatia' and 'Romania' in order.

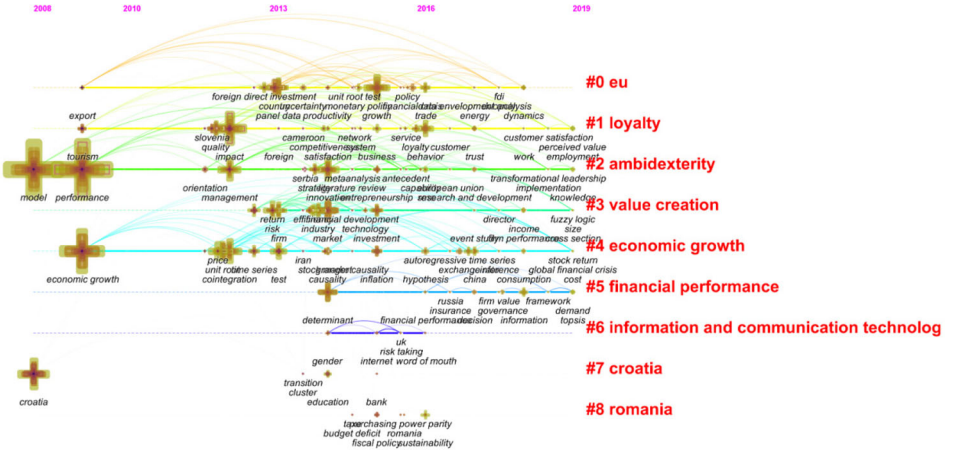


Figure 14. The timeline view of keywords for publications.

Figure 14 shows the timeline view of keywords to illustrate the development and the trend of the hot topics from 2007 to 2019. There are four stages from time's perspective. Specifically, it focussed more on the 'model', 'performance', 'economic growth' and 'Croatia' between 2007 and 2010. The keywords of 'quality', 'impact', 'management' and 'foreign direct investment' occurred most from 2010 to 2013. It paid more attention to 'unit root test', 'service', 'loyalty customer' and 'financial development' between 2013 and 2016. Over the last three years, the publications preferred to occur keywords like 'customer satisfaction', 'transformational leadership', 'fuzzy logic' and 'stock return'. Therefore, the keywords of publications in the journal have changed continually over time, and *Economic Research-Ekonomska Istraživanja* has focussed more on dealing with the practical problems in business and economic under complex and uncertain environments.

4. Discussion

Economic Research-Ekonomska Istraživanja explores broad economic topics that can contribute to the development of economics. After the bibliometric analysis, we have further discussed the possible reasons and given the future suggestions.

According to general analysis of the journal, the publications' structure and the development trend are explored. The characteristics of publications, productive countries/regions and productive institutions are summarised as follows:

1. The publication-year distribution shows an increasing trend from 2007 to 2019, the reason may be that the journal has been developed, and more and more researchers pay attention to it. The trend of citations had been increasing from 2007 to 2015, and publications received the most citations (489) in 2015, which indicates that the journal has gained more and more recognition.
2. The most type of publications is article, and occupies 96.631%. There are more high-quality publications in 2010 and 2014 because of highest AC and H-index, respectively.

3. In terms of evaluation indicators, it is the trend that the highly cited publication is cooperative. Because communication and cooperation are a good way to improve the quality of publication, and the cooperation has become increasingly remarkable and important among countries/regions, institutions and authors.
4. Since the top 3 cited publications are related to decision making, it is a hot and important research direction. The reason may be that decision making has been widely studied from both basic theory and practical application.
5. Publications cover about 68 countries/regions, and the productive countries/regions are mainly from Europe and East Asia. In terms of TP, TC, AC and H-index, Lithuania and Croatia are prominent, which shows that publications in the journal from these two countries have higher influence.
6. Six of the top 10 productive institutions are from Croatia, which shows that the institutions in Croatia have a strong interest in the journal. University of Zagreb (Croatia) is the most productive institution, and Vilnius Gediminas Technical University (Lithuania) is the most influential institution. Therefore, the journal has aroused special attention for scholars in Croatia and Lithuania.

According to science mapping analysis of the journal, the internal network structures and hot topics are presented intuitively in the following aspects:

1. Considering the cited references/sources of publications in the journal, the results of co-citation networks show that the top 10 cited references are from 1979 to 2002 without significant TC, which indicates that publications cite references universally. The top 10 cited sources are all economic or management journals, and researchers can focus on publications in these journals.
2. Co-authorship analysis shows cooperative countries/regions and authors. The results present that partnerships between countries/regions are relatively fixed and limited. Zavadskas, E. K. (Lithuania) performs well about cooperation, and more than half of prominent authors are from Lithuania. Therefore, transnational cooperation can be further increased for high-quality publications in the future.
3. Burst detection analysis reflects the emerging trends that attracted attention during a certain period. According to the results of citation bursts, researchers can pay more attention to those authors (NARAYAN P.K., LEE C.C., SHAHBAZ M. and JENSEN M.C.) and journals (*J. MONEY CREDIT BANK* and *MANAGE DECIS.*).
4. Co-occurrence analysis and timeline view analysis show the knowledge structure and research trends in the journal. According to the results, the following research topics can be considered in the future: (a) To study monetary policy of a country/region taking into account multiple factors, such as inflation, interest rates and exchange rate, combined with panel-data, granger causality and autoregressive time series method. (b) To study economic growth of a country/region considering GDP, globalisation economic crisis, investment and CO_2 emissions. (c) To study a corporation's stock returns taking risks in drastic competition under uncertain market environment. (d) To study the poverty and education of a country/region based on models. (e) To study industry orientation and sustainable development based on network data envelopment analysis, analytic hierarchy

process and fuzzy logic methods. (f) To study the satisfaction, loyalty and trust perceptions of employees in social media.

Considering the characteristics of publications, influential countries/regions and institutions, and science mapping analysis about the journal from 2007 to 2019, we discuss future challenges of the *Economic Research-Ekonomska Istraživanja*.

1. Although the papers were first published in the journal in 2007, the number of publications has been almost increasing up to now, and the trend of citations increases from 2007 to 2015. This phenomenon suggests that the journal has created its influence in business and economics. Specifically, the countries/regions from Europe and East Asia pay more attention to the journal, and the journal may expand the influence by cooperating with the countries/regions in other continents.
2. Whether influential countries/regions and institutions, or highly cited publications, institutions and authors from Croatia, Lithuania and Slovenia have performed well. Therefore, it is worth considering increasing scientific influence all over the world, and the authors in other countries have opportunities and challenges to publish their papers in *Economic Research-Ekonomska Istraživanja* in a variety of ways, such as international communication and cooperation.
3. Based on science mapping analysis, the networks of co-citation analysis and co-authorship analysis are relatively sparse. References and authors are not obvious in co-citation networks, and the same situation exists in the co-authorship network of authors, expect for Zavadskas, E. K. Therefore, it is a challenge to increase the attention of *Economic Research-Ekonomska Istraživanja* to develop scientific research and academic journal. In terms of timeline view analysis of keywords, hot topics have turned to personalised service and financial issues under complex and uncertain environment, such as 'customer satisfaction', 'fuzzy logic' and 'stock return'. We can see it that the publications in *Economic Research-Ekonomska Istraživanja* prefer to continuous innovation and progress continuously about business and economics to reply the recent developments.

5. Conclusions

This paper presents a bibliometric analysis of *Economic Research-Ekonomska Istraživanja* from 2007 to 2019 based on WoS. According to VoS viewer and CiteSpace, the work conducts an analysis mainly from three perspectives: characteristics of publications, influential countries/regions and institutions, and science mapping analysis. The number of publications has almost been steadily increasing since 2007. Croatia is the most productive country, and Lithuania is the most influential country. The top 3 productive institutions are University of Zagreb (Croatia), University of Ljubljana (Slovenia) and Juraj Dobrila University of Pula (Croatia), respectively. The prominent author is Zavadskas, E. K. (Lithuania), and he contributes to *Economic Research-Ekonomska Istraživanja*. We discuss some future challenges of the journal according to the above analysis.

Overall, the paper provides an aim view of *Economic Research-Ekonomska Istraživanja* by bibliometric analysis, which is an essential and valuable tool for scholars to understand the trend and grasp some hot topics of a journal or a research direction. The work is hopefully contributed to the scholars related to business and economics, and it may help researchers to pay attention to the journal and further develop scientific research themes. We will monitor the development of the journal and related fields, and further research bibliometric methods in depth with text mining.

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