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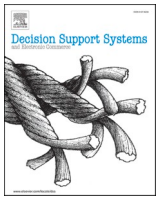

40 years of Decision Support Systems: A bibliometric analysis

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ABSTRACT

Decision Support Systems (DSS) is a leading international journal dedicated to decision support system research and practice, with the aim of exploring theoretical and technical advancements to facilitate enhanced decision making in industry, commerce, government, and other business settings. The journal published its first issue in 1985, and in 2025, celebrates its 40th anniversary. Motivated by this special event, this paper develops a comprehensive bibliometric analysis to present a lifetime overview of the development characteristics and leading trends of DSS journal between 1985 and 2023. By using the bibliographic data collected from the Scopus and Web of Science Core Collection databases, this study analyzes the publication and citation structure of the journal and investigates a wide range of issues including the most cited papers, the most cited documents by the journal's publications, the citing articles, the most productive and influential authors, institutions and countries/territories, and the most popular keywords and topics. Moreover, this work also graphically maps the bibliographic material by using the visualization of similarities (VOS) viewer software. In the graphical analysis, several bibliometric techniques in terms of co-citation, bibliographic coupling, and co-occurrence of author keywords are adopted. The results accentuate the significant growth and impact of DSS journal throughout its lifetime. It is expected that the journal will continue to grow its international reputation and disseminate knowledge in decision support, information systems, and business area, providing an efficient mechanism for researchers around the world to keep abreast with advances in the scientific community.

1. Introduction

Decision Support Systems (DSS) journal is a leading international journal devoted to the research on a diverse range of theoretical and technical advancements in support of enhanced decision making, including those from decision theory, economics, econometrics, statistics, computer-supported cooperative work, database management, linguistics, management science, mathematical modeling, operations management, cognitive science, psychology, and user interface management, among others [1,2]. The key research areas addressed in the journal include foundations, functionality, interfaces, implementation, impacts, and evaluation of DSS usage in industry. DSS journal was launched in 1985; it is not only aimed as an interdisciplinary forum for researchers and developers but also aims to be readable and accessible to practitioners and managers [1]. The publisher of DSS journal is Elsevier; however, the journal was published with the imprint of North-Holland (merged with Elsevier in 1970 [3]) until February 1995. With DSS journal's insistence on identifying and publishing original research work that makes significant contributions to the DSS field, the journal has developed to the point of being widely recognized as a premier international periodical in the scientific community that attracts high-quality papers from all over the world [2,4].

Hans-Jochen Schneider (previously with the Technical University of Berlin) and Andrew (Andy) B. Whinston (previously with Purdue University and now with the University of Texas-Austin since 1988) were founding Editors-in-Chief of DSS journal and published the first issue in January 1985 [1]. In 1992, Hans-Jochen and his assistant Dimitris Karagiannis (now with the University of Vienna) stepped down, while Andy remained in charge as Editor-in-Chief until 2013 when James R. Marsden of the University of Connecticut took over the position. By contributing to the publication of 54 volumes of DSS journal from 1985 to 2013, Andy played a pivotal role in the journal's development and guided the emergence of DSS journal into an internationally influential research outlet. Andy continued serving as Emeritus Editor-in-Chief, and Veronika Whinston (University of Texas-Austin) as Emeritus Managing Editor until July 2014. James was Editor-in-Chief and led the journal for

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nine years (2013−2021). Since 2022, Andrew N. K. Chen of the University of Kansas and Victoria Y. Yoon of Virginia Commonwealth University have served as the journal's Editors-in-Chief, while James serves as Emeritus Editor.

The first editorial structure of DSS journal was comprised of two Editors-in-Chief, an assistant to the Editors-in-Chief, and an Editorial Board for professional guidance. Over the years, the structure changed several times. In 1992, six new editorial departments, including DSS Foundations, DSS Development-Functionality, DSS Development-Interfaces, DSS Impacts and Evaluation, DSS Reference Studies, and DSS Experiences, Management, and Education were introduced to help structure the consideration of manuscripts across these topics of DSS research, and several scholars were appointed as Area Editors [4]. Thus, the editorial structure then included an Editor-in-Chief, Area Editors, and Associate Editors. Veronika joined the team in 1994 as Editorial Assistant and was then appointed as Managing Editor between 2006 and 2013. A new editorial department – DSS Digital and Web Computing – was further incorporated into the journal in December 2002, while in April 2013, the DSS Impacts and Evaluation was removed from existing editorial departments. Due to the increasing popularity and prominence of the journal, the DSS journal's editorial team was restructured in August 2014 into a new system consisting of an Editor-in-Chief, an Editorial Advisory Board, Senior Editors, and Associate Editors [2]. The current editorial team of the journal includes two Editors-in-Chief, one Emeritus Editor, 16 members of the Editorial Advisory Board, 35 Senior Editors, and 80 Associate Editors. The editors and editorial board members are from over 20 countries/regions around the world, and their number has more than doubled since the journal's foundation.

During the first years from 1985 to 1991, DSS journal published four issues per year, and in 1992, six issues containing 35 documents. Due to the significant growth in the number of submissions around the world, the journal continued to increase the number of articles published per year during the period 1993–2013, publishing six to 13 issues per year divided into multiple volumes. In 2012, the annual number of publications reached a record of 208 articles. Since 2014, the journal has been publishing 12 volumes per year on a monthly basis (11 volumes were published in 2018) and in recent years, around 100 articles have been published each year. Owing to the high-quality publications during the lifetime of DSS journal, the journal has received high ratings according to various qualitative and quantitative measures. It was the official journal of the International Society for Decision Support Systems [4,5] which in 2003 was merged with the Association for Information Systems (AIS) Special Interest Group on Decision Support, Knowledge and Data Management Systems (now the AIS Special Interest Group on Decision Support and Analytics) and since 2023, it has been included in the 11 "Senior Scholars' List of Premier Journals" of the AIS (https://aisnet.org/page/SeniorScholarListofPremierJournals).

Additionally, the journal has received an A* ranking (the highest) from the Australian Business Deans Council since 2010 (https://abdc.edu.au/abdc-journal-quality-list/) and also from the Australian Council of Professor and Heads of Information Systems since 2014 (https://www.acphis.org/acphis-journal-list). According to the 2023 Journal Citation Reports (JCR) of Clarivate Web of Science (WoS), DSS journal has an impact factor (IF) of 6.7, being ranked in the ninth position out of 106 journals in the WoS category of "Operations Research & Management Science (OR&MS)", 26th out of 250 journals under the "Computer Science, Information Systems" category, and 31st out of 197 journals within the "Computer Science, Artificial Intelligence" category [6]. In the 2023 CiteScore rank published by Scopus of Elsevier, the journal has a rating of 14.7, obtaining the fourth place among 552 journals in the Scopus category of "Arts and Humanities, Arts and Humanities (miscellaneous)", seventh out of 360 journals in the "Psychology, Developmental and Educational Psychology" category, 22nd among 394 journals in the "Computer Science, Information Systems" category, ninth among 148 journals within the category of "Decision Sciences, Information Systems and Management", and ninth out of 131 journals under the category of "Business, Management and Accounting, Management Information Systems" [7]. All these ratings and metrics further demonstrate that DSS journal is a leading international journal with a high reputation across multiple disciplines.

In 2025, DSS journal becomes 40 years old, and motivated by the journal's 40th anniversary, this paper aims to develop a general bibliometric analysis of the leading trends occurring in the journal between 1985 and 2023. The study analyzes a wide range of bibliometric issues, including the publication and citation structure of the journal, the most cited papers, the most cited documents by the journal's publications, the citing articles, the most productive and influential authors, institutions, and countries/territories, and the most popular author keywords and topics. This work mainly uses the Scopus database to collect all the publications of DSS journal during the period 1985–2023 and analyze the bibliographic data based on various bibliometric indicators [8–11]. Only in several particular cases, the WoS Core Collection database is used. In addition, this study also develops a mapping analysis by employing the visualization of similarities (VOS) viewer software [12] to graphically visualize the bibliographic material based on the bibliometric techniques including co-citation [13], bibliographic coupling [14], and co-occurrence of author keywords [9,10].

In the literature, it is very common to organize some special activities when a journal reaches its milestone years, including special issues [15–22], editorials [23–26], and reviews [27–32]. To attract readers' attention to a journal, special anniversaries are also developed for remarkable topics [33–38], institutions [39–41], or scholars [42,43] by publishing special issues or representative articles in the journal. It is worth noting that many journals have carried out a bibliometric analysis of the journal, particularly through the celebration of their anniversaries.

For example, Heck and Bremser [44] analyzed the first six decades of the *Accounting Review* and identified the authors and institutions that have made the most frequent contributions to the journal. Schwert [45] provided a retrospective evaluation of the *Journal of Financial Economics* in the period 1974–1991. Inkpen and Beamish [46] studied the first 25 years of research published in the *Journal of International Business Studies* to evaluate the relative contributions of authors and disciplinary trends in the journal. Cobo et al. [47] presented a thorough bibliometric analysis of the research conducted by *Knowledge-Based Systems* from 1991 to 2014 to commemorate the journal's 25th anniversary. Merigó et al. [48] developed a systematic bibliometric overview of the *Journal of Business Research* between 1973 and 2014, Laengle et al. [49] of the first 25 years of *Group Decision and Negotiation*, Yu et al. [50] of *IEEE Transactions on Fuzzy Systems* during the period 1994–2015, Wang and Sun [51] of the *International Journal of Production Research* between 1977 and 2018, Shukla et al. [52] of the first 30 years of *Engineering Applications of Artificial Intelligence*, and Yu et al. [53] of *Fuzzy Optimization and Decision Making* from 2002 to 2017.

Recently, Calma et al. [54] investigated the topics, impact, and trends of the first 68 years of *Operations Research* using bibliometric methods; Wang et al. [55] provided a bibliometric and time series analysis of the *International Journal of Systems Science* to celebrate its 50th anniversary; Kraus et al. [56] analyzed the topical structure of *Technological Forecasting and Social Change* and tracked the most cited articles in the journal from 1969 to 2022 using a combination of structural topic modeling and bibliometric analysis; and Guan et al. [10] presented a comprehensive bibliometric overview of the most significant development patterns and trends of *Computers & Operations*

Research during its first half-century of publishing history.

Particularly, many journals have celebrated their respective 40th anniversary and analyzed their past academic performance and leading trends by publishing bibliometric studies, including the *European Journal of Operational Research* [57], *Computers & Industrial Engineering* [8], *Safety Science* [58], *Omega-International Journal of Management Science* [59], *Transportation Research Part B-Methodological* [60], *Technovation* [61], *Journal of Futures Markets* [62], the *International Journal of Information Management* [63], *Journal of Accounting and Public Policy* [64], and *Risk Analysis* [65].

In addition, a number of journals in the fields of OR&MS, computer science, business, management, and engineering have also published bibliometric overviews related to a wide range of topics, such as ant colony optimization [66], grey system theory [67], fuzzy theory [68,69], hesitant fuzzy sets [70], type-2 fuzzy sets [71,72], analytic network process [73], analytic hierarchy process [74–76], genetic algorithms [77], best worst method [78], neutrosophic sets [79], rough sets [80], metaheuristics [81], data envelopment analysis [82,83], entrepreneurship [84,85], intelligent decision [86,87], linguistic decision making [88], fuzzy big data [89], multi-criteria decision making (MCDM) [90–92], deep learning [93,94], among others.

Observe that DSS journal published one special issue in 2010 to commemorate the 95th birthday of Professor William *W. Cooper*, who made many pioneering contributions in a variety of fields, particularly operations research, management science, accounting, and economics [95]. In addition, several bibliometric studies focused on specific research topics have also been published in the journal. For example, Eom et al. [96] conducted an initial study to identify the intellectual structure of research in DSS from 1971 to 1989 using factor analysis and multi-dimensional scaling of author co-citation analysis and later, Eom [97] further expanded the timeframe (over the period of 1971 through 1993) to map the intellectual structure of DSS more comprehensively. Wang et al. [98] examined the intellectual structure of cloud computing research in the information systems discipline using bibliometric methods (e.g., citation, co-citation, and main path analyses). Keenan and Jankowski [99] developed a bibliometric analysis to trace the intellectual, methodological, and technological trends influencing the development of the Spatial DSS field over three decades from its inception in the mid-1980s. Through performing a bibliometric analysis, Tobon et al. [100] established a conceptual map of the literature on gamified systems in the context of consumer decisions to help investigate whether or not gamification influences engagement and online consumer decisions. However, to the best of our knowledge, no work has yet been done to provide a general bibliometric overview of DSS journal in the last four decades. Therefore, this is the first bibliometric study contributing to a systematic and comprehensive retrospective of the leading trends occurring in DSS journal since its foundation.

The remainder of this paper is organized as follows. Section 2 presents the bibliometric analysis results of DSS journal, focusing on the publication and citation structure, the most cited papers, the most cited documents by the journal's publications, the citing articles, and the leading authors, institutions, and countries/territories contributing to the journal. Section 3 provides a graphical visualization of the bibliographic information using the VOSviewer software. Section 4 concludes this paper with a summary of the principal findings and existing limitations of the study. Note that the methodology section of the paper is presented in Appendix A.

2. Bibliometric analysis results

This section presents the bibliometric analysis of DSS journal using Scopus data between 1985 and 2023. It is structured into three major parts. The first part focuses on the journal's overall publication and citation structure, providing a general overview of the journal's research outputs and impact on the scientific community. The second part analyzes the most cited papers in DSS journal, the most cited documents by the journal's publications, and citing articles to the journal, facilitating the identification of the key documents that have contributed to or influenced by DSS journal. In the last part of this section, the leading authors, institutions, and countries/territories associated with the journal and their respective temporal evolutions are investigated. In addition, the journal's publication structure concerning the main supranational regions is also explored.

2.1. Publication and citation structure of DSS journal

DSS journal started publishing articles in January 1985. Due to the increasing intensity of research and activities in the DSS field and the strong development of advanced knowledge and technologies in multiple disciplines associated with decision making problems, the journal has grown significantly through time. Fig. 1 illustrates the annual number of documents published in DSS journal from 1985 to 2023. This is also presented in Table 1. Note that the DSS journal's publications considered in the study only include articles, reviews, and conference papers.

During the initial years, the journal was publishing 20–30 papers per year with a clean upward trend and in 1994, for the first time, the number of annual publications exceeded 50 (i.e., 64 papers). In the period 1994–2000, the journal maintained a relatively stable annual output with an average of 67 papers published each year. From 2001 to 2003, this number decreased to 54 papers per year. In 2004, the journal started growing significantly with 83 publications, and in 2007, the number grew to 160. Observe that although the annual number of publications dropped to around 110 papers in 2009 and 2010, it grew very quickly again in 2011 and subsequently reached a peak of 208 papers in 2012. The expansion of DSS journal represented by the considerable growth in published papers is mainly because of the massive increase in the number of submissions to the journal from all over the world. The rapid development of computer and internet technologies especially since the first decade of the millennium facilitates gathering a greater volume of information and connecting timely to the newest trends in the DSS field. A similar result is occurring in most of the journals, and it is particularly motivated by the development of research worldwide [10,48,54,58]. Since 2015, the journal has stepped into a stable development stage, publishing an average of about 110 papers each year. It is expected that the annual publications will continue to grow with the increasing number of submissions to the journal from around the world. By decade, the number of papers published in DSS journal is: 274 (1985–1993), 631 (1994–2003), 1445 (2004–2013), and 1171 (2014–2023). It is worth noting that the journal has published over 74 % of its total publications over the last two decades.

To examine the publication pattern of DSS journal more deeply, we examine the annual citation structure of the journal. This work considers the total number of citations that the journal's publications each year have received, and several citation thresholds selected (i.e., equal or more than one, five, 10, 20, 50, 100, 200, and 500 citations) to identify the number of papers that have reached a specific number of citations. Table 1 presents the results. In addition, the last column of the table shows the number of papers in each year that are among the 50 most cited papers of all time in the journal.

From the results shown in Table 1, the total number of citations for annual publications of DSS journal has been growing over time and many papers have been highly cited, indicating that the journal has been able to maintain a good quality and profoundly influence the

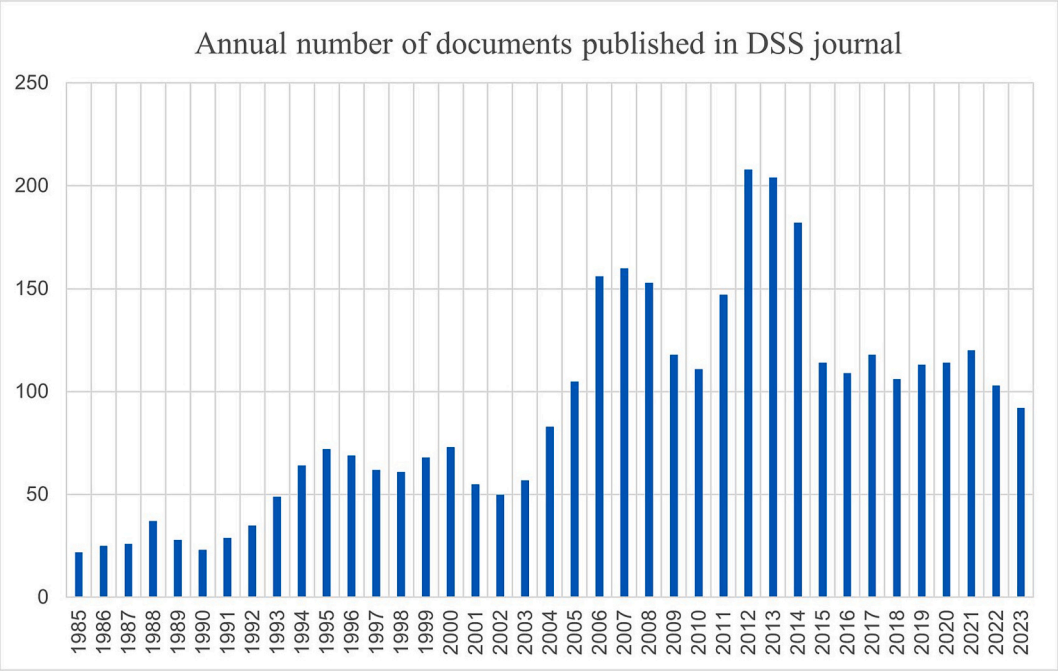

Fig. 1. Annual number of documents published in DSS journal.

development of DSS research over its entire lifetime. Note that the inflation effect in publications and citations should also be considered when comparing different years with the information provided in Table 1, although there is currently no consensus on how to correctly evaluate it [101]. During the first years from 1985 to 1993, DSS journal did not get many citations (only the papers published in 1989, 1992, and 1993 have received more than 1000 citations) partly because of the lower number of publications. In this period, only two papers have obtained more than 200 citations, one of which is among the 50 most cited in the journal. It is worth noting that one paper published in 1995 is currently listed as the second most cited paper of the journal, contributing to over half of the citations received by all the papers published in that year. Since 1998, the total number of citations by year has been growing significantly, where it has increased to over 12,000 citations for the publications in 2006 and peaked at 15,952 citations in 2012.

In addition to the high increase in the number of publications of DSS journal over time, the significant growth of research worldwide and the development of the Scopus database also led to the surge in journal citations. Most of the highly cited papers were published during the decade between 2004 and 2013, meaning that the journal's performance has improved remarkably in this period. However, it is important to know that the papers published during the last decade still need more time to achieve their maximum citation level. From an overall perspective, the journal has 36 papers with more than 500 citations, representing around 1 % of all the documents. About 5 % of the documents have obtained 200 or more citations, 14.6 % 100 or more, and 31.6 % 50 or more. Almost 63 % of the papers have received at least 20 citations, 81 % at least 10, and 92 % at least five. Only 19 papers of the journal have not been cited yet by the documents indexed in Scopus.

Further, to provide a more complete overview of the citation structure of all the papers published in the journal from 1985 to 2023, we investigate the citation distributions of annual publications and the citation-related statistical information using a box-and-whisker plot approach [102]. Fig. 2 visualizes the results including the average, median, first quartile, third quartile, interquartile range (IQR), minimum value, maximum value, and outliers for the citation data of annual publications. Specifically, the boxplot structure presents the set of documents concerning a specific year and identifies the 25th percentile (first quartile), 50th percentile (second quartile or median), and 75th percentile (third quartile) where the most cited papers are. The IQR ranging between the 25th percentile and 75th percentile represents where the middle half of the set of documents for a specific year is, and the wider the IQR, the more dispersed the citation spread of the middle half of the documents. In addition, the upper and lower whiskers denote the range of their respective boundaries calculated by 1.5 times the IQR. The minimum value is at the end of the lower whisker, while the maximum value is at the end of the upper whisker. The "×" mark in the figure indicates the average number of citations per paper regarding each specific year. Moreover, the single dots above the upper whiskers are classified as outliers in the box-and-whisker structure. Note that the figure is adjusted to 700 citations, and the highly cited papers with more than 700 citations are represented by the red dots.

From Fig. 2, we see that most of the outliers (the highly cited papers) are distributed in the years between 1999 and 2016. The top three most cited papers of the journal are from 2007 (2679 citations), 1995 (2645 citations), and 2006 (2484 citations). The citation distributions of the annual publications for the period 2001–2013 are currently more dispersed, as indicated by the wider IQR and the larger range of extreme values. In contrast, the size of the IQR especially during the period 1990–1993 and in the last years from 2021 to 2023 is rather small, which is mainly because the citation distributions in these periods are very concentrated and at the same time, the number of citations received by the papers is relatively low. Note that the papers published in 2003 have the highest median of citations, half of the publications in 2003 have received more than around 50 citations. The highest average citation occurred in 2011, with around 100 citations per paper.

Next, we analyze the evolution of DSS journal's performance from 1997 to 2023 based on the available data provided by JCR in the WoS [6]. Table 2 presents the results associated with a series of bibliometric indicators that are particularly used to measure the journal's quality and

Table 1
Annual citation structure of DSS journal.

Year	TP	TC	≥500	≥200	≥100	≥50	≥20	≥10	≥5	≥1	T50
1985	22	403	0	0	0	3	7	14	19	22	0
1986	25	619	0	0	0	5	10	14	19	25	0
1987	26	662	0	0	1	4	10	15	18	26	0
1988	37	849	0	0	1	6	13	21	30	36	0
1989	28	1305	0	1	5	7	12	17	21	28	0
1990	23	367	0	0	1	1	3	7	13	22	0
1991	29	301	0	0	0	0	6	13	19	26	0
1992	35	1133	0	1	2	4	9	21	25	32	1
1993	49	1063	0	0	0	4	23	31	41	49	0
1994	64	2189	0	2	5	7	23	33	49	64	1
1995	72	4867	1	2	7	12	26	45	59	72	1
1996	69	1498	0	1	2	8	23	37	48	67	0
1997	62	1785	0	0	3	11	25	45	58	61	0
1998	61	3129	0	3	6	17	34	47	54	61	1
1999	68	3489	0	3	10	16	40	57	65	68	0
2000	73	4907	2	5	10	19	45	59	65	72	2
2001	55	5268	1	8	13	22	39	48	52	55	2
2002	50	3813	1	3	7	22	37	45	48	50	1
2003	57	3464	0	2	10	29	42	49	53	57	0
2004	83	6700	3	7	20	31	56	70	79	83	3
2005	105	5498	0	2	15	37	80	95	99	104	0
2006	156	12,609	4	7	24	65	114	135	150	156	4
2007	160	14,647	2	13	37	59	126	149	159	160	3
2008	153	12,766	2	10	28	55	108	143	149	152	2
2009	118	9890	2	10	26	44	89	110	118	118	5
2010	111	8958	2	10	23	48	78	102	107	111	3
2011	147	15,284	6	20	35	69	119	136	140	147	6
2012	208	15,952	2	19	43	85	151	183	204	208	4
2013	204	15,579	4	15	46	87	147	176	197	203	5
2014	182	12,043	2	13	29	65	131	163	178	181	3
2015	114	8054	1	6	19	47	88	106	112	114	1
2016	109	7031	1	5	20	48	84	97	106	109	2
2017	118	7046	0	6	18	49	84	106	114	118	0
2018	106	6302	0	5	22	40	81	95	102	106	0
2019	113	4826	0	1	15	31	71	97	110	113	0
2020	114	4920	0	2	10	32	78	99	110	114	0
2021	120	3591	0	2	3	18	60	94	111	120	0
2022	103	1870	0	0	0	6	35	69	89	103	0
2023	92	760	0	0	0	1	8	28	57	89	0
85–93	274	6702	0	2	10	34	93	153	205	266	1
94–03	631	34,409	5	29	73	163	334	465	551	627	8
04–13	1445	117,883	27	113	297	580	1068	1299	1402	1442	35
14–23	1171	56,443	4	40	136	337	720	954	1089	1167	6
Total	3521	215,437	36	184	516	1114	2215	2871	3247	3502	50
%	100 %	–	1.02 %	5.23 %	14.65 %	31.64 %	62.91 %	81.54 %	92.22 %	99.46 %	–

Abbreviations: TP and TC = Total papers and citations; ≥500, ≥200, ≥100, ≥50, ≥20, ≥10, ≥5, ≥1 = Number of papers with equal or more than 500, 200, 100, 50, 20, 10, 5 and 1 citations; T50 = Number of papers in Table 4.

impact. For each JCR year between 1997 and 2023, the work considers the total citations (TC*) that the journal has received (from all journals included in the WoS Core Collection database), the journal IF, the 5-year IF, the immediacy index, the number of citable items (articles and reviews), the article influence score, the average IF percentile, and the journal's separate rank, quartile, and percentile by the IF in the three WoS categories of "Computer Science, Artificial Intelligence (AI)", "Computer Science, Information Systems (IS)", and "Operations Research & Management Science (OR&MS)". Note that TC* in the table measures the total number of times that any paper published in DSS journal (articles or reviews) has been cited in a specific year. This is different from the total citations (TC) of Table 1 describing currently the citations received by all the papers published in a specific year.

The results of Table 2 demonstrate the strong influence that DSS has, especially since the new millennium. The number of citable items shows a growing tendency that is consistent with the evolution of the annual number of publications presented in Table 1. The TC* has increased dramatically from 213 citations in 1997 to a top of 15,272 in 2021, representing a significant growth in the journal's widespread recognition by the academic community. The citations obtained for most of the international journals have increased a lot owing to the rising number of annual research publications around the world and the huge increase in the number of scholarly journals indexed in the WoS Core Collection database (currently covering more than 22,000 journals).

Since the electronic journal IF of the JCR started in 1997, the IF of DSS journal has shown a remarkable rise from 0.264 in 1997 to a record of 7.5 in 2022, currently being 6.7. Similarly, the 5-year IF of the journal has also been increasing rapidly since 2007, which reached a peak of 8.191 in 2021. Although there was a slight decrease in the 5-year journal IF in the recent two years (8.1 in 2022 and 7.5 in 2023), the associated values remain at a relatively high level. The immediacy index of the journal grew quickly, especially from 2016, and exceeded one for the first time in 2020, indicating that the journal's publications have been attracting citations more rapidly over time. The article influence score of the journal, measuring the average influence of articles from the journal published in the past five years, also shows an upward trend. Note that the journal's article influence score has been greater than 1.00 since 2017 (peaking at 1.577 in 2023), which means that each article in the journal has above-average influence.

Since the beginning of the millennium, the DSS journal's rank, quartile, and percentile by the IF under the three WoS categories (i.e., AI, IS, and OR&MS) have been growing significantly, and so did its average IF percentile. Particularly, the journal has been frequently achieving the top 10 positions among the journals in the OR&MS

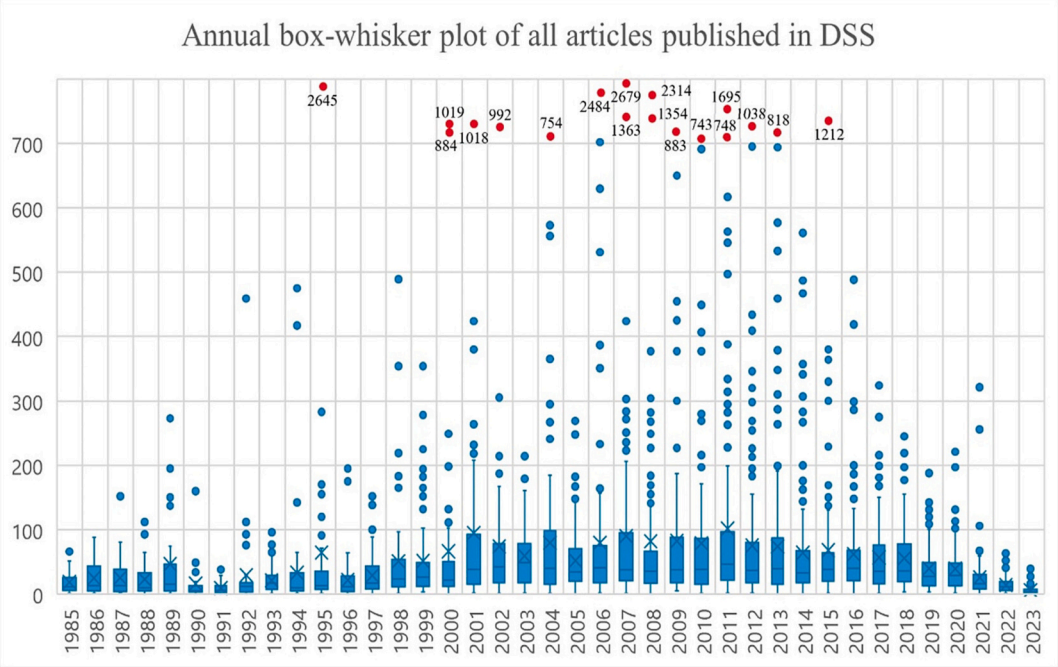

Fig. 2. Annual box-and-whisker structure of the citations of all the papers published in DSS journal.

Table 2
Analysis of DSS journal in the JCR of WoS.

Year	TC*	IF	5YIF	ImIn	CI	AIS	AJIF	RAI	Q	PAI	RIS	Q*	PIS	ROR	Q+	POR
1997	213	0.264	–	0.00	0	–	30.710	34/54	Q3	37.96	37/52	Q3	29.81	30/39	Q4	24.36
1998	254	0.227	–	0.00	61	–	27.470	46/62	Q3	26.61	42/59	Q3	29.66	33/44	Q3	26.14
1999	215	0.355	–	0.00	68	–	46.752	37/63	Q3	42.06	32/62	Q3	49.19	26/50	Q3	49.00
2000	479	0.543	–	0.014	73	–	57.061	37/71	Q3	48.59	32/67	Q2	52.99	16/51	Q2	69.61
2001	528	0.511	–	0.036	55	–	54.053	38/72	Q3	47.92	39/73	Q3	47.26	18/53	Q2	66.98
2002	688	0.781	–	0.186	43	–	67.275	30/74	Q2	60.14	29/77	Q2	62.99	12/54	Q1	78.70
2003	765	1.316	–	0.297	64	–	79.166	26/77	Q2	66.88	20/78	Q2	75.00	3/57	Q1	95.61
2004	861	1.458	–	0.060	83	–	81.250	21/78	Q2	73.72	19/78	Q1	76.28	4/56	Q1	93.75
2005	992	0.946	–	0.267	105	–	60.645	39/79	Q2	51.27	41/83	Q2	51.20	12/56	Q1	79.46
2006	1292	1.160	–	0.045	156	–	67.018	37/85	Q2	57.06	34/87	Q2	61.49	11/60	Q1	82.50
2007	1645	1.119	1.725	0.262	160	0.608	64.236	43/93	Q2	54.30	38/92	Q2	59.24	13/60	Q1	79.17
2008	2633	1.873	2.276	0.381	118	0.482	73.765	32/94	Q2	66.49	29/99	Q2	71.21	11/64	Q1	83.59
2009	3376	2.623	2.842	0.269	119	0.683	88.248	19/103	Q1	82.04	15/116	Q1	87.50	4/73	Q1	95.21
2010	3233	2.135	2.573	0.252	111	0.708	83.950	25/108	Q1	77.31	22/128	Q1	83.20	7/75	Q1	91.33
2011	2984	1.687	2.331	0.270	148	0.678	78.966	33/111	Q2	70.72	26/135	Q1	81.11	12/77	Q1	85.06
2012	3895	2.201	3.037	0.196	209	0.863	88.113	20/115	Q1	83.04	16/132	Q1	88.26	6/79	Q1	93.04
2013	4196	2.036	2.651	0.214	206	0.758	84.298	27/121	Q1	78.10	20/135	Q1	85.56	9/79	Q1	89.24
2014	5149	2.313	2.933	0.235	183	0.846	84.780	27/123	Q1	78.46	16/139	Q1	88.85	11/81	Q1	87.04
2015	5886	2.604	3.271	0.246	114	0.916	86.731	25/130	Q1	81.15	14/144	Q1	90.63	10/82	Q1	88.41
2016	8109	3.222	4.290	0.573	110	0.930	83.766	25/133	Q1	81.58	28/146	Q1	81.16	10/83	Q1	88.55
2017	8810	3.565	4.574	0.571	119	1.035	85.481	23/132	Q1	82.95	23/148	Q1	84.80	10/84	Q1	88.69
2018	9734	3.847	4.903	0.729	107	1.014	81.969	30/134	Q1	77.99	29/155	Q1	81.61	12/84	Q1	86.31
2019	10,739	4.721	5.434	0.602	113	1.103	86.462	24/137	Q1	82.85	23/156	Q1	85.58	8/83	Q1	90.96
2020	13,580	5.795	6.934	1.079	114	1.398	82.719	29/139	Q1	79.50	27/161	Q1	83.54	13/84	Q1	85.12
2021	15,272	6.969	8.191	1.721	140	1.413	82.963	33/145	Q1	77.59	24/164	Q1	85.67	13/87	Q1	85.63
2022	14,918	7.5	8.1	1.6	98	1.536	85.4	31/145	Q1	79.0	19/158	Q1	88.3	10/86	Q1	89.0
2023	13,405	6.7	7.5	0.9	133	1.577	88.8	31/197	Q1	84.5	26/249	Q1	89.8	9/106	Q1	92.0

Abbreviations: TC* = Total citations; IF = Impact factor; 5YIF = 5-year impact factor; ImIn = Immediacy index; CI = Citable items (articles and reviews); AIS = Article Influence Score; AJIF = Average journal impact factor percentile; RAI = Ranking by journal impact factor in the WoS category of Computer Science, Artificial Intelligence (AI); Q = Journal impact factor quartile in AI; PAI = Journal impact factor percentile in AI; RIS = Ranking by journal impact factor in the WoS category of Computer Science, Information Systems (IS); Q* = Journal impact factor quartile in IS; PIS = Journal impact factor percentile in IS; ROR = Ranking by journal impact factor in the WoS category of Operations Research & Management Science (OR&MS); Q+ = Journal impact factor quartile in OR&MS; POR = Journal impact factor percentile in OR&MS.

category. Moreover, the journal has remained in the first quartile (Q1) with high IF percentile values in all three categories since 2012, further demonstrating DSS journal's leading position in these fields throughout the years. According to the 2023 edition of JCR, the journal's IF percentile score has achieved 84.5 in the AI category, 89.8 in the IS category, and 92.0 in the OR&MS category and accordingly, the journal has reached a peak of 88.8 in terms of the average IF percentile score. These results show that the journal performs very well in relation to its peers and strongly influences scientific research in multiple fields.

This work also examines the publication and citation performances

Table 3
Publication record of leading journals in OR&MS and other related fields.

R	Journal	H10	C10	P10	C/P10	H	TC	TP	C/P	≥500	YW	Y	IF	CS
–	Decis Support Syst	96	44,266	1176	37.64	167	161,024	3373	47.74	22	1991	1985	6.7	14.7
1	Computers Human Behav	189	256,490	5223	49.11	239	415,883	7498	55.47	52	1990	1985	9.0	19.1
2	Exp Syst Appl	178	303,818	10,523	28.87	244	659,772	18,791	35.11	44	1991	1990	7.5	13.8
3	Eur J Oper Res	155	200,145	6656	30.07	297	830,322	19,134	43.40	107	1978	1977	6.0	11.9
4	Int J Prod Econ[1]	148	138,030	3023	45.66	212	356,192	8182	43.53	41	1976	1976	9.8	21.4
5	Knowl-Based Syst	146	177,096	5939	29.82	165	237,700	7605	31.26	15	1991	1987	7.2	14.8
6	Strategic Manag J	134	78,934	1142	69.12	366	629,606	3051	206.36	236	1980	1980	6.5	13.7
7	Int J Prod Res	131	138,855	4157	33.40	178	349,888	11,436	30.60	18	1977	1961	7.0	19.2
8	IEEE Trans Knowl Data Eng	127	91,244	3048	29.94	182	231,032	5316	43.46	44	1992	1989	8.9	11.7
9	Acad Manag J	127	60,771	764	79.54	411	634,349	3094	205.03	318	1958	1958	9.5	16.0
10	Management Science	124	93,854	2871	32.69	334	655,737	8335	78.67	184	1954	1954	4.6	8.8
11	Omega - Int J Manag Sci	100	51,085	1302	39.24	162	149,562	3592	41.64	25	1974	1973	6.7	13.8
12	Information Manag	99	42,920	931	46.10	169	149,818	2684	55.82	39	1983	1977	8.2	17.9
13	MIS Quarterly	98	34,940	596	58.62	254	326,297	1594	204.70	109	1979	1977	7.0	13.3
14	J Consumer Research	97	33,182	635	52.26	290	386,713	2481	155.87	134	1974	1974	5.7	12.0
15	J Marketing	96	33,754	458	73.70	345	488,568	3694	132.26	214	1936	1934	11.5	24.1
16	Acad Manag Rev	94	26,163	329	79.52	371	577,727	1476	391.41	276	1983	1976	19.3	24.6
17	Commun ACM	85	109,864	914	120.20	266	506,969	7010	72.32	131	1958	1958	11.1	16.1
18	Organization Science	84	31,674	824	38.44	282	348,369	2126	163.86	132	1990	1990	4.9	7.9
19	Econometrica	83	29,491	698	42.25	357	758,003	4628	163.79	257	1933	1933	6.6	11.0
20	J Marketing Res	79	25,608	597	42.89	259	397,927	2909	136.79	105	1964	1964	5.1	10.3
21	Information Syst Res	75	25,170	593	42.45	170	151,157	1365	110.74	52	1990	1990	5.0	9.1
22	J Manag Inform Syst	72	17,963	412	43.60	141	87,092	968	89.97	18	1999	1984	5.9	10.2
23	Eur J Inform Syst	65	14,303	358	39.95	110	55,524	1075	51.65	9	1993	1991	7.3	23.1
24	AEU - Int J Electr Comm	64	42,326	3322	12.74	72	64,957	6197	10.48	1	1974	1947	3.0	6.9
25	Operations Research	64	22,163	1047	21.17	223	301,135	5867	51.33	59	1956	1952	2.2	4.8
26	Org Behav Human Dec Proc[2]	63	16,918	558	30.32	212	285,127	3003	94.95	56	1966	1966	3.4	8.9
27	Marketing Science	61	15,466	520	29.74	161	119,800	1548	77.39	24	1987	1982	4.0	8.6
28	Machine Learning	59	18,767	881	21.30	168	235,891	1956	120.60	63	1990	1986	4.3	11.0
29	Artificial Intelligence	58	19,379	874	22.17	200	203,408	2976	68.35	57	1970	1970	5.1	11.2
30	Harvard Business Rev	55	15,534	757	20.52	246	303,315	7329	41.39	110	1922	1922	9.1	1.4
31	Decision Sciences	48	8815	393	22.43	126	77,769	1558	49.92	17	1984	1970	2.8	12.4

Abbreviations: R = Rank; J = Journal; H10, C10, P10 and C/P10 = *h*-index, citations, publications and citations per paper between 2014 and 2023 available in WoS; H, TC, TP and C/P = *h*-index, citations, publications and citations per paper available in WoS; ≥500 = Number of articles with equal or more than 500 citations; YW = The first year available in WoS; Y = Year of origin; IF = Impact factor 2023 (WoS); CS = CiteScore 2023 (Scopus). The numbers provided in the table only consider "Articles" and "Review Articles" in WoS up to 31 December 2023.

[1] The International Journal of Production Economics was formerly known as Engineering Costs and Production Economics (previously, Engineering and Process Economics).

[2] Organizational Behavior and Human Decision Processes was formerly known as Organizational Behavior and Human Performance.

of DSS journal in comparison to those of other leading journals in the field of OR&MS and other related fields connected to the journal. We aim to provide a general overview of the journals that are strongly connected to DSS journal, the highly cited journals (as shown in Table 5 and Fig. 4) and the top citing journals (as shown in Table 7) of DSS journal are also considered during the journal selection process. We use several bibliometric indicators to evaluate and compare journals' performances, including the *h*-index, the number of citations, the number of publications, and the ratio of citations per paper, respectively, regarding the papers published in the past 10 years (i.e., 2014–2023) and in the period since the first year of a journal available in WoS, as well as the number of papers achieving the threshold of 500 citations, the journal IF in the 2023 edition of JCR, and the journal's CiteScore 2023 (obtained from Scopus). Table 3 presents the results of a total of 32 selected leading journals (including DSS journal) mainly based on the bibliographic information available in WoS. Note that the table ranks all the journals according to the *h*-index in the recent decade, and in case of a tie, the total number of citations of the papers published between 2014 and 2023 is further considered.

From the comparison, we see that DSS journal has indeed become well-established in the scientific community with a multidisciplinary profile and has gained a strong competitive advantage over many other leading journals connected to the fields such as OR&MS, computer science, business, economics, management, engineering, information science, psychology, and social sciences. When looking at the publication record over the last decade from 2014 to 2023, DSS journal is currently ranked in the 15th position with an *h*-index of 96, surpassing over half of the total leading journals considered. The journal has published 1176 papers during this period and obtained 44,266 citations, achieving an average of 37.64 citations per paper. The top leading journal with the highest *h*-index (189) in the recent decade is *Computers in Human Behavior*, and *Expert Systems with Applications* is the most productive and influential journal which has published 10,523 papers between 2014 and 2023 and attracted 303,818 citations. *Communications of the ACM* occupies the first place in terms of the citations per paper indicator for this period (with a ratio of 120.20), followed by *Academy of Management Journal* (79.54), *Academy of Management Review* (79.52), and the *Journal of Marketing* (73.70).

We observe that with respect to the bibliometric results of the *h*-index, the number of citations, and the number of publications regarding the period 2014–2023, DSS journal outperforms several other journals specialized in the specific area of information systems, including *Information Systems Research*, *Journal of Management Information Systems*, and *European Journal of Information Systems*, although its ratio of citations per paper is slightly lower than these journals'. Moreover, the publication and citation performances of DSS journal in the recent decade are also better than *Operations Research*, one of the most reputable journals in OR&MS, and noticeably, with a similar number of publications between 2014 and 2023, DSS journal has obtained nearly twice the number of citations that of *Operations Research*. Generally, many of the journals in the list have greatly increased the number of papers published over the last decade, contributing to a great proportion of the total number of citations received by far and a higher *h*-index.

For a longer time window that considers all the publications of these selected journals available in WoS up to 31 December 2023, the *Academy of Management Journal* has the highest *h*-index (411) and the largest

Table 4
The 50 most cited papers in DSS journal.

R	TC	Title	Author/s	Year	C/Y
1	2679	A survey of trust and reputation systems for online service provision	Jøsang, A.; Ismail, R.; Boyd, C.	2007	157.59
2	2645	Design and natural science research on information technology	March, S.T.; Smith, G.F.	1995	91.21
3	2484	Understanding knowledge sharing in virtual communities: An integration of social capital and social cognitive theories	Chiu, C.-M.; Hsu, M.-H.; Wang, E.T.G.	2006	138.00
4	2314	A trust-based consumer decision-making model in electronic commerce: The role of trust, perceived risk, and their antecedents	Kim, D.J.; Ferrin, D.L.; Rao, H.R.	2008	144.63
5	1695	Cloud computing - The business perspective	Marston, S.; Li, Z.; Bandyopadhyay, S.; Zhang, JH; Ghalsasi, A.	2011	130.38
6	1363	Value-based adoption of mobile internet: An empirical investigation	Kim, H.-W.; Chan, H.C.; Gupta, S.	2007	80.18
7	1354	Do online reviews matter? - An empirical investigation of panel data	Duan, W.; Gu, B.; Whinston, A.B.	2008	84.63
8	1212	Recommender system application developments: A survey	Lu, J.; Wu, D.; Mao, M.; Wang, W.; Zhang, G.	2015	134.67
9	1038	The impact of electronic word-of-mouth communication: A literature analysis and integrative model	Cheung, C.M.K.; Thadani, D.R.	2012	86.50
10	1019	Combining belief functions when evidence conflicts	Murphy, C.K.	2000	42.46
11	1018	An empirical analysis of the antecedents of electronic commerce service continuance	Bhattacherjee, A.	2001	44.26
12	992	Past, present, and future of decision support technology	Shim, J.P.; Warkentin, M.; Courtney, J.F.; Power, D.J.; Sharda, R.; Carlsson, C.	2002	45.09
13	884	Technology acceptance model and the World Wide Web	Lederer, A.L.; Maupin, D.J.; Sena, M.P.; Zhuang, Y.	2000	36.83
14	883	Modeling wine preferences by data mining from physicochemical properties	Cortez, P.; Cerdeira, A.; Almeida, F.; Matos, T.; Reis, J.	2009	58.87
15	818	A review of modeling approaches for sustainable supply chain management	Seuring, S.	2013	74.36
16	754	Credit rating analysis with support vector machines and neural networks: A market comparative study	Huang, Z.; Chen, H.; Hsu, C.-J.; Chen, W.-H.; Wu, S.	2004	37.70
17	748	The application of data mining techniques in financial fraud detection: A classification framework and an academic review of literature	Ngai, E.W.T.; Hu, Y.; Wong, Y.H.; Chen, Y.; Sun, X.	2011	57.54
18	743	Examining multi-dimensional trust and multi-faceted risk in initial acceptance of emerging technologies: An empirical study of mobile banking services	Luo, X.; Li, H.; Zhang, J.; Shim, J.P.	2010	53.07
19	702	Understanding continued information technology usage behavior: A comparison of three models in the context of mobile internet	Hong, S.; Thong, J.Y.L.; Tam, K.Y.	2006	39.00
20	695	What drives consumers to spread electronic word of mouth in online consumer-opinion platforms	Cheung, C.M.K.; Lee, M.K.O.	2012	57.92
21	694	An empirical examination of continuance intention of mobile payment services	Zhou, T.	2013	63.09
22	691	The impact of personal dispositions on information sensitivity, privacy concern and trust in disclosing health information online	Bansal, G.; Zahedi, F.; Gefen, D.	2010	49.36
23	650	Encouraging information security behaviors in organizations: Role of penalties, pressures and perceived effectiveness	Herath, T.; Rao, H.R.	2009	43.33
24	630	Accessing information sharing and information quality in supply chain management	Li, S.; Lin, B.	2006	35.00
25	617	Data mining for credit card fraud: A comparative study	Bhattacharyya, S.; Jha, S.; Tharakunnel, K.; Westland, J.C.	2011	47.46
26	577	The impact of IT capabilities on firm performance: The mediating roles of absorptive capacity and supply chain agility	Liu, H.; Ke, W.; Wei, K.-K.; Hua, Z.	2013	52.45
27	573	Combining belief functions based on distance of evidence	Deng, Y.; Shi, W.K.; Zhu, Z.F.; Liu, Q.	2004	28.65
28	563	Exploring determinants of voting for the "helpfulness" of online user reviews: A text mining approach	Cao, Q.; Duan, W.; Gan, Q.	2011	43.31
29	561	A data-driven approach to predict the success of bank telemarketing	Moro, S.; Cortez, P.; Rita, P.	2014	56.10
30	556	Internet self-efficacy and electronic service acceptance	Hsu, M.-H.; Chiu, C.-M.	2004	27.80
31	546	A multi-objective optimization for green supply chain network design	Wang, F.; Lai, X.; Shi, N.	2011	42.00
32	533	A study of mobile user engagement (MoEN): Engagement motivations, perceived value, satisfaction, and continued engagement intention	Kim, Y.H.; Kim, D.J.; Wachter, K.	2013	48.45
33	531	Adoption of internet banking: An empirical study in Hong Kong	Cheng, T.C.E.; Lam, D.Y.C.; Yeung, A.C.L.	2006	29.50
34	497	The personalization privacy paradox: An exploratory study of decision making process for location-aware marketing	Xu, H.; Luo, X.; Carroll, J.M.; Rosson, M.B.	2011	38.23
35	489	An empirical study on consumer acceptance of products in electronic markets: A transaction cost model	Liang, T.P.; Huang, J.-S.	1998	18.81
36	488	Predicting the performance of online consumer reviews: A sentiment mining approach to big data analytics	Salehan, M.; Kim, D.J.	2016	61.00
37	487	Examining the influence of online reviews on consumers' decision-making: A heuristic-systematic model	Zhang, K.Z.K.; Zhao, S.J.; Cheung, C.M.K.; Lee, M.K.O.	2014	48.70
38	475	Bankruptcy prediction using neural networks	Wilson, R.L.; Sharda, R.	1994	15.83
39	467	Predicting crime using Twitter and kernel density estimation	Gerber, M.S.	2014	46.70
40	459	Leveraging the capabilities of service-oriented decision support systems: Putting analytics and big data in cloud	Demirkan, H.; Delen, D.	2013	41.73
41	459	Group decision support with the Analytic Hierarchy Process	Dyer, R.F.; Forman, E.H.	1992	14.34
42	455	Virtual communities: A marketing perspective	de Valck, K.; van Bruggen, G.H.; Wierenga, B.	2009	30.33
43	449	A theoretical model of intentional social action in online social networks	Cheung, C.M.K.; Lee, M.K.O.	2010	32.07
44	434	Predicting consumer decisions to adopt mobile commerce: Cross country empirical examination between China and Malaysia	Chong, A.Y.-L.; Chan, F.T.S.; Ooi, K.B.	2012	36.17
45	427	Financial time series forecasting using independent component analysis and support vector regression	Lu, C.-J.; Lee, T.-S.; Chiu, C.-C.	2009	28.47
46	425	Studying users' computer security behavior: A health belief perspective	Ng, B.-Y.; Kankanhalli, A.; Xu, Y.(C.)	2009	28.33
47	424	A review for mobile commerce research and applications	Ngai, E.W.T.; Gunasekaran, A.	2007	24.94
48	424	Knowledge management and data mining for marketing	Shaw, M.J.; Subramaniam, C.; Tan, G.W.; Welge, M.E.	2001	18.43
49	419	Consumer behavior in social commerce: A literature review	Zhang, K.Z.K.; Benyoucef, M.	2016	52.38
50	418	Manipulation of online reviews: An analysis of ratings, readability, and sentiments	Hu, N.; Bose, I.; Koh, N.S.; Liu, L.	2012	34.83

Abbreviations: R = Rank; TC = Total citations; C/Y = Citations per year.

number of highly cited papers achieving 500 citations (318). In addition, the *European Journal of Operational Research*, with a total of 19,134 papers and 830,322 citations, is identified as the most productive and influential journal in the list, followed by *Expert Systems with Applications* which has published 18,791 papers and received 659,772 citations. However, in terms of the ratio of citations per paper, the two journals lose their top leading positions, while the *Academy of Management Review* gets the highest value of 391.41, and *Strategic Management Journal*, *Academy of Management Journal*, and *MIS Quarterly* also perform remarkably well achieving an average of more than 200 citations per paper.

It is worth noting that in addition to the *Academy of Management Journal*, several other journals also obtain a significant number of highly cited papers with over 500 citations, including *Academy of Management Review* (276), *Econometrica* (257), *Strategic Management Journal* (236), and *Journal of Marketing* (214). With respect to the current journal IF and CiteScore, the *Academy of Management Review* is ranked first among all these journals, having an IF of 19.3 and a CiteScore of 24.6. We also see in the table that *Harvard Business Review* is the oldest journal (founded in 1922) having more than 100 years of its publication history, while the *European Journal of Information Systems* is the youngest but still over 30 years old. Most of the leading journals have almost full coverage of their lifetime publications in the WoS Core Collection database.

Considering the size of a journal and the publication history since a journal's foundation, DSS journal exhibits strong performances and significant impacts, especially dedicated to the DSS field. Over the period from 1991 to 2023, DSS journal, with a total of 3373 publications and 161,024 citations, yields a citations per paper ratio of 47.74 and an *h*-index of 167; additionally, the journal has 22 papers with more than 500 citations and the competitive values in terms of IF (6.7) and CiteScore (14.7), accentuating its position as a high-impact journal in multiple fields. Note that in previous studies such as Laengle et al. [57], Wang et al. [59], Guan et al. [11], and Hussain et al. [103], DSS journal is also recognized as one of the top journals in the areas of OR&MS and related fields.

Table 5
Top 50 most cited documents by the DSS journal's publications.

R	Year	First author	Reference	Vol	Page	Type	TC	C/Y
1	1989	Davis, F.D.	MIS Quarterly	v13	p319	A	118	3.37
2	1981	Fornell, C.	J Marketing Res	v18	p39	A	115	2.67
3	2003	Podsakoff, P.M.	J Appl Psychol	v88	p879	A	102	4.86
4	2004	Hevner, A.R.	MIS Quarterly	v28	p75	A	85	4.25
5	2006	Chevalier, J.A.	J Marketing Res	v43	p345	A	81	4.50
6	1982	Sprague, R.H.	Building Effective DSS	–	–	B	67	1.60
7	2003	Venkatesh, V.	MIS Quarterly	v27	p425	A	62	2.95
8	1989	Davis, F.D.	Management Science	v35	p982	A	62	1.77
9	1992	DeLone, W.H.	Information Syst Res	v3	p60	A	60	1.88
10	2008	Duan, W.	Decis Support Syst	v45	p1007	A	59	3.69
11	1978	Nunnally, J.C.	Psychometric Theory	–	–	B	53	1.15
12	2010	Mudambi, S.M.	MIS Quarterly	v34	p185	A	51	3.64
13	1987	Geoffrion, A.M.	Management Science	v33	p547	A	51	1.38
14	1987	Desanctis, G.	Management Science	v33	p589	A	50	1.35
15	1976	Keeney, R.L.	Decisions Multiple Object Pref	–	–	B	50	1.04
16	1980	Saaty, T.L.	The Analytic Hierarchy Process	–	–	B	49	1.11
17	2010	Hair, J.F.	Multivariate Data Analysis	v7	–	B	48	3.43
18	1978	Nunnally, J.C.	Psychometric Methods	–	–	B	48	1.04
19	1977	Simon, H.A.	New Sci Manag Decis	–	–	B	48	1.02
20	2014	Quinlan, J.R.	C4.5: Programs Machine Learn	–	–	B	47	4.70
21	2008	Forman, C.	Information Syst Res	v19	p291	A	47	2.94
22	1991	Ajzen, I.	Organiz Behav Human Decis Proc	v50	p179	A	47	1.42
23	2002	Shim, J.P.	Decis Support Syst	v33	p111	A	46	2.09
24	1986	Baron, R.M.	J Pers Soc Psychol	v51	p1173	A	46	1.21
25	2008	Kim, D.J.	Decis Support Syst	v44	p544	A	45	2.81
26	2003	Blei, D.M.	J Machine Learn Res	v3	p993	A	45	2.14
27	1998	Chin, W.W.	Modern Methods Business Res	–	p295	BC	45	1.73
28	1978	Keen, P.	Decision Support System	–	–	B	45	0.98
29	2006	Liu, Y.	J Marketing	v70	p74	A	44	2.44
30	1995	Mayer, R.C.	Acad Manag Rev	v20	p709	A	44	1.52
31	2005	Adomavicius, G.	IEEE Trans Knowl Data Eng	v17	p734	A	43	2.26
32	2000	Venkatesh, V.	Management Science	v46	p186	A	43	1.79
33	2001	Breiman, L.	Machine Learning	v45	p5	A	42	1.83
34	1988	Cohen, J.	Stat Power Anal Behav Sci	–	–	B	42	1.17
35	1986	Quinlan, J.R.	Machine Learning	v1	p81	A	42	1.11
36	2001	Bhattacherjee, A.	MIS Quarterly	v25	p351	A	40	1.74
37	1974	Tversky, A.	Science	v185	p1124	A	40	0.80
38	2010	Zhu, F.	J Marketing	v74	p133	A	39	2.79
39	2003	Dellarocas, C.	Management Science	v49	p1407	A	39	1.86
40	2003	Gefen, D.	MIS Quarterly	v27	p51	A	39	1.86
41	1995	Goodhue, D.L.	MIS Quarterly	v19	p213	A	39	1.34
42	2003	DeLone, W.H.	J Manag Inform Syst	v19	p9	A	38	1.81
43	1998	Chin, W.W.	MIS Quarterly	v22	pvii	A	38	1.46
44	2003	Chin, W.W.	Information Syst Res	v14	p189	A	37	1.76
45	2005	Wasko, M.M.	MIS Quarterly	v29	p35	A	36	1.89
46	1965	Zadeh, L.A.	Inform Control	v8	p338	A	36	0.61
47	2007	Jøsang, A.	Decis Support Syst	v43	p618	A	35	2.06
48	1979	Kahneman, D.	Econometrica	v47	p263	A	34	0.76
49	1972	Newell, A.	Human Problem Solving	–	–	B	34	0.65
50	2002	Ba, S.L.	MIS Quarterly	v26	p243	A	33	1.50

Abbreviations: R = Rank; A = Article; B = Book; BC = Book chapter; TC = Total citations available in WoS; C/Y = Citations per year.

2.2. Influential papers in DSS journal

DSS journal has published many significant papers that have been highly cited by global researchers and have had profound influences on the development of DSS research. In this section, let us investigate the most frequently cited papers in the journal, the most cited documents specifically within the journal's publications, and the top citing articles to DSS journal. Table 4 presents the 50 most cited papers in DSS journal according to the Scopus database. In the case of a tie in the number of citations, the more recently published paper appears first in the table. Note that the table only represents the current picture, so the results may change in the future if newer papers become very popular in the academic community.

The most cited paper in DSS journal was published in 2007 by Audun Jøsang, Roslan Ismail, and Colin Boyd [104] on a comprehensive survey of the state-of-the-art in trust and reputation systems for online service provision. It currently has a total of 2679 citations and continues to obtain the highest number of citations per year with 157.59 on average. This paper is also listed among the 200 most cited papers in the research field of OR&MS [105]. The second most cited paper is from 1995 by Salvatore T. March and Gerald F. Smith [106], which investigated the research issues in information technology and proposed a two-dimensional framework for information technology research by considering the integration of design and natural sciences. This paper has already received 2645 citations, yielding a relatively high value of average citations per year of 91.21.

The seminal papers ranked in the third and fourth positions in the list have also obtained more than 2000 citations each. Specifically, the third most cited paper in the journal, authored by Chao-Min Chiu, Meng-Hsiang Hsu, and Eric T. G. Wang [107] on studying the motivations behind people's knowledge sharing in virtual communities by integrating the social cognitive theory and the social capital theory, was published in 2006 with a total of 2484 citations and an average of 138 citations per year (ranked third regarding the average citations per year). The journal's fourth most cited paper written by Dan J. Kim, Donald L. Ferrin, and H. Raghav Rao [108] in 2008 possesses 2314 citations and on average 144.63 citations per year (ranked second regarding the average citations per year), focusing on developing a trust-based consumer decision making model in electronic commerce that helps recognize the role of trust, perceived risk, and their antecedents in consumers' online purchasing decisions. The paper published in 2015 by Jie Lu and other co-authors [109] on a survey of recommender system application developments also achieves a very high citation rate per year with 134.67 on average (1212 citations over nine years).

The research topics of the 50 most cited papers cover a broad range of theoretical and technical advancements (e.g., cloud computing, data mining, modeling, neural networks, text mining, big data analytics, and optimization) in enabling improvements in decision making across diverse practical applications (e.g., electronic commerce, marketing, supply chain management, fraud detection, online services, and information security).

There are some other noteworthy and interesting findings from Table 4. Firstly, among the 50 most cited papers in DSS journal, only four papers were published in the 1990s, while the remaining 46 papers are all from the first two decades of the millennium (that is, 22 from the period 2000–2009, and 24 from the period 2010–2016). Note that all the top 50 highly cited papers have received more than 400 citations each. These results suggest that the DSS journal's publications are having significant influences in the scientific community, and their impacts have grown increasingly over time. Moreover, the year 2011 leads the table with six highly cited papers, followed by the years 2009 and 2013 with five each. In addition, 19 papers among the top 50 have more than 50 citations per year, and five more than 100 citations per year. However, more recent publications still need time to accumulate citations and maximize their influence.

Most of the top 50 influential papers in the journal are co-authored work, while only five papers are with a single author (i.e., the studies of Catherine K. Murphy [110] on combining belief functions when evidence conflicts, Anol Bhattacherjee [111] on an empirical analysis of the antecedents of electronic commerce service continuance, Stefan Seuring [112] on a review of modeling approaches for sustainable supply chain management, Tao Zhou [113] on an empirical examination of continuance intention of mobile payment services, and Matthew S. Gerber [114] on predicting crime using Twitter and kernel density estimation).

Furthermore, Christy M.K. Cheung has four papers ([115–118]) in the top 50, and Dan J. Kim ([108,119,120]) and Matthew K.O. Lee ([116–118]), three each; 10 authors have published two influential papers each in the list, including Chao-Min Chiu and Meng-Hsiang Hsu ([107,121]), Eric W.T. Ngai ([122,123]), H. Raghav Rao ([108,124]), Jung P. Shim ([125,126]), Kem Z.K. Zhang ([117,127]), Paulo Cortez ([128,129]), Ramesh Sharda ([125,130]), Wenjing Duan ([131,132]), and Xin (Robert) Luo ([126,133]).

It is also interesting to analyze documents that have received the most citations by papers published in DSS journal. Our study uses the VOSviewer software [12] and conducts a co-citation analysis of the cited references to identify the 50 most popular and influential documents in the journal. Table 5 presents the results. Note that in the co-citation analysis of the documents, we use the bibliographic data of the DSS journal's publications (during the period between 1991 and 2023) that are retrieved from the WoS Core Collection database. The table ranks the documents according to their number of citations, and in case of a tie, the ratio of citations per year is further considered.

During the publication history of the DSS journal from 1991 to 2023, the document most frequently cited by the journal is the seminal paper entitled "Perceived usefulness, perceived ease of use, and user acceptance of information technology" by Fred D. Davis [134] published in *MIS Quarterly* in 1989. This paper has been cited in the 118 publications of the journal with an average of 3.37 citations per year, which is closely followed by the work of Claes Fornell and David F. Larcker [135] in 1981 on "Evaluating structural equation models with unobservable variables and measurement error" published in the *Journal of Marketing Research* (with 115 citations by DSS journal). The third position goes to the paper by Philip M. Podsakoff [136] in 2003 as the first author of a critical review of common method biases in behavioral research (published in the *Journal of Applied Psychology*), with a total of 102 citations received from the DSS journal's publications and 4.86 citations per year on average (the highest ratio of citations per year in the list).

Most recent work frequently cited by the journal is the book "C4.5: Programs for Machine Learning" published in 2014 by J. Ross Quinlan [137] (a computer science researcher in data mining and decision theory contributed extensively to the development of decision tree algorithms), while the oldest document in the list is the seminal work of Lotfi. A. Zadeh [138] on fuzzy sets published in 1965. Moreover, many other classic theoretical and methodological studies are also included in the table, such as Jum C. Nunnally's pioneering contributions to psychometric theory and methods [139], Herbert A. Simon's (1978 Nobel Prize winner in Economics) work on the new science of management decision [140], Amos Tversky and Daniel Kahneman (2002 Nobel Prize winner in Economics) paper published in *Science* in 1974 on the heuristics and biases in making judgments under uncertainty [141] and their seminal work on prospect theory published in *Econometrica* in 1979 [142], as well as Thomas L. Saaty's representative book in 1980 on the analytic hierarchy process [143].

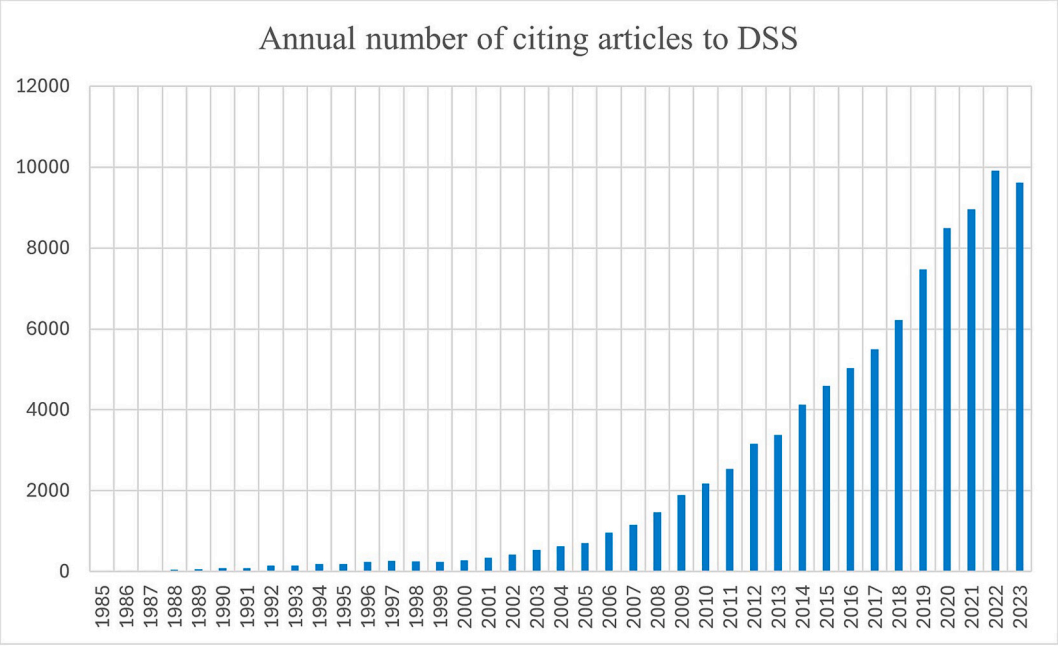

Fig. 3. Annual number of citing articles to DSS journal.

Table 6
Citing articles to DSS journal: Authors, institutions, and countries/territories.

R	Author	TP	Institution	TP	Country/Territory	TP
1	Deng, Y.	151	Hong Kong Polytechnic U	960	China	20,410
2	Herrera-Viedma, E.	136	City U Hong Kong	842	USA	18,129
3	Dwivedi, Y.K.	126	Chinese Academy of Sciences	673	UK	6489
4	Xu, Z.	119	Tsinghua U	574	India	6433
5	Chen, H.	94	Huazhong U Science Technology	560	Taiwan	5388
6	Dong, Y.	94	Harbin Institute of Technology	556	Australia	4225
7	Kou, G.	93	U Tehran	551	Spain	3971
8	Chan, F.T.S.	88	Xi'an Jiaotong U	549	South Korea	3707
9	Oliveira, T.	85	Sichuan U	532	Germany	3600
10	Cheng, T.C.E.	77	U Science Technology China	524	Iran	3309
11	Ngai, E.W.T.	77	Shanghai Jiao Tong U	520	Canada	3027
12	Martínez, L.	74	Wuhan U	504	Malaysia	3015
13	Delen, D.	72	National U Singapore	503	Italy	2744
14	Rana, N.P.	72	Hefei U Technology	499	France	2570
15	Gunasekaran, A.	71	U Granada	465	Netherlands	2075
16	Tavana, M.	71	Zhejiang U	442	Turkey	1864
17	Zhou, T.	71	National Cheng Kung U	442	Brazil	1760
18	Baesens, B.	70	Dalian U Technology	432	Saudi Arabia	1495
19	Zaidan, A.A.	70	U Electronic Sci Tech China	427	Indonesia	1195
20	Zaidan, B.B.	70	Tianjin U	418	Portugal	1182
21	Zavadskas, E.K.	68	Tongji U	415	Pakistan	1166
22	Pedrycz, W.	67	Nanyang Technological U	391	Greece	1158
23	Law, R.	66	U Malaya	384	Singapore	1149
24	Lee, K.C.	66	U Arizona	382	Finland	1148
25	Lu, J.	66	U Chinese Academy of Sciences	376	Poland	973
26	Piramuthu, S.	66	Central South U	371	Belgium	900
27	Liao, H.	63	U Tech Malaysia	366	Japan	899
28	Rao, H.R.	63	King Abdulaziz U	359	Sweden	858
29	Whinston, A.B.	63	Beihang U	357	Switzerland	812
30	Fan, Z.P.	62	U Technology Sydney	353	South Africa	741
31	Lowry, P.B.	62	National Central U	353	Austria	726
32	Chiclana, F.	61	Delft U Technology	350	Thailand	726
33	Fan, W.	61	Virginia Polytechnic Inst State U	349	United Arab Emirates	721
34	Yen, D.C.	59	Queensland U Technology	348	Norway	696
35	Bose, I.	58	Islamic Azad U	343	Denmark	684
36	Chen, X.	57	Korea Advanced Inst Sci Tech	342	Vietnam	654
37	Herrera, F.	57	Northeastern U	341	Jordan	608
38	Meng, F.	57	Beijing Inst Technology	326	New Zealand	601
39	Ooi, K.B.	56	Nanjing U	320	Ireland	561
40	Zhang, G.	56	Yonsei U	318	Israel	514

Abbreviations: R = Rank; TP = Total papers (citing articles).

Table 7
Citing articles to DSS journal: Journals and keywords.

R	Journal	TP	Keyword	TP
1	Decision Support Systems	2502	Decision Making	9765
2	Expert Systems with Applications	1950	Decision Support Systems	5585
3	Sustainability	1451	Artificial Intelligence	3745
4	IEEE Access	1109	Data Mining	3742
5	European J Operational Research	971	Machine Learning	3426
6	Computers in Human Behavior	783	Forecasting	3380
7	Information & Management	775	Sales	3272
8	Knowledge-Based Systems	670	Social Networking (online)	3170
9	Computers & Industrial Engineering	649	Commerce	2982
10	Int J Production Research	597	Electronic Commerce	2926
11	Int J Information Management	546	Social Media	2704
12	Int J Production Economics	544	Learning Systems	2546
13	Information Sciences	521	Optimization	2450
14	J Business Research	515	Knowledge Management	2385
15	J Cleaner Production	460	Trust	2318
16	J Retailing and Consumer Services	456	Supply Chain Management	2213
17	Technological Forecasting and Social Change	456	Supply Chains	2149
18	Electronic Commerce Research and Applications	442	Internet	2101
19	Industrial Management & Data Systems	423	Risk Assessment	2093
20	Information Systems Frontiers	392	Information Systems	2090
21	Frontiers in Psychology	388	Costs	2063
22	Applied Sciences	387	Behavioral Research	1969
23	Annals of Operations Research	386	Neural Networks	1845
24	PLOS One	370	Information Management	1742
25	Internet Research	368	Sustainable Development	1618
26	J Management Information Systems	357	Sentiment Analysis	1617
27	J Intelligent & Fuzzy Systems	344	Marketing	1569
28	Information Systems Research	343	Information Technology	1558
29	J Computer Information Systems	332	Big Data	1540
30	Behavior & Information Technology	328	Decision Theory	1522
31	MIS Quarterly	328	Deep Learning	1490
32	Applied Soft Computing	312	Sustainability	1455
33	Mathematical Problems in Engineering	301	Economic and Social Effects	1444
34	Information Technology & People	283	China	1388
35	J Theoretical and Applied Information Technology	279	Competition	1384
36	J Operational Research Society	264	Investments	1377
37	Int J Business Information Systems	261	Regression Analysis	1369
38	Soft Computing	260	Semantics	1319
39	Group Decision and Negotiation	251	Genetic Algorithms	1296
40	Mathematics	250	Customer Satisfaction	1288

Abbreviations: R = Rank; TP = Total papers (citing articles).

Note that Wynne W. Chin has three documents on the list as the first author, and five other authors have two each, including Fred D. Davis, J. Ross Quinlan, Jum C. Nunnally, Viswanath Venkatesh, and William H. DeLone. It is also observed that among the top 50 most cited documents by the journal's publications, 38 (76 %) are articles published in academic journals, 12 (24 %) are books or book chapters. In addition, of all the articles, 10 are from *MIS Quarterly*, five from *Management Science*, four from the DSS journal, three from *Information Systems Research*, and the remaining 16 articles were published by journals related to marketing, computer science, management, engineering, psychology, and economics, which also indicates the interdisciplinary characteristic of DSS journal drawing on knowledge from diverse disciplines.

To further identify the origin of the DSS journal's citations, we consider the citing articles to the journal's publications. That is, those articles that have cited at least one publication of the journal. Note that if one document cites many publications of the same journal in its reference list, the counting only considers one unit. The data was collected from the Scopus database by looking into the journal's citations. After limiting the documents to "articles" and "reviews" published between 1985 and 2023, we retrieved a total of 91,584 documents that have cited DSS journal. Fig. 3 shows the annual number of citing articles to the journal.

In the first two decades of DSS journal's publication history, the annual number of citing articles to the journal has witnessed a slow increase. Since 2005, there has been a sharp rise in the annual number of citing articles; specifically, the number first exceeded 2000 in 2010, and it only took another decade (to 2020) to exceed 8000. In 2022, the journal obtained a record of the number of citing articles with almost 10,000. The rapid expansion of the annual number of citing articles to DSS journal demonstrates that the influence of the journal has been growing significantly in the scientific community, especially since 2004. This trend is expected to continue with the sound development of the journal in the future.

In addition, the citing articles of DSS journal are analyzed more deeply from the aspects of citing authors, institutions, countries/territories, journals, and keywords. Table 6 presents the top 40 authors, institutions, and countries/territories with the highest number of papers citing the DSS journal.

Yong Deng is the author who cites DSS journal most frequently with 151 papers, followed by Enrique Herrera-Viedma, Yogesh K. Dwivedi, and Zeshui Xu having 136, 126, and 119 papers that have cited the journal, respectively. It is worth noting that 14 authors in the list are also among the authors who have contributed to the 50 most cited papers in DSS journal (as shown in Table 4).

At the institution level, the Hong Kong Polytechnic University leads the ranking with 960 papers citing the journal, and the second and third positions go to the City University of Hong Kong (842 papers) and the Chinese Academy of Sciences (673 papers), respectively. Observe that more than half of the top 40 institutions in the list are from China, of which nine take the top 10 spots. However, in this table, only three institutions are from the USA, and none of the institutions are from the UK.

Looking at the countries/territories, China (20,410 papers) and the USA (18,129 papers) are the top two countries with the highest number

Table 8
Top 50 leading authors in DSS journal.

R	Author Name	Institution	Country/ Territory	TP	TC	H	C/P	≥50	≥10	T50
1	Chen, H.	U Arizona	USA	41	2951	27	71.98	13	39	1
2	Bose, I.	NEOMA Business School	France	31	2167	22	69.90	12	25	1
3	Piramuthu, S.	U Florida	USA	31	1310	23	42.26	7	29	0
4	Delen, D.	Oklahoma State U	USA	27	2250	23	83.33	16	27	1
5	Rao, H.R.	U Texas San Antonio	USA	26	4834	20	185.92	13	25	2
6	Whinston, A.B.	U Texas Austin	USA	23	2447	17	106.39	12	20	1
7	Luo, X.	U New Mexico	USA	19	2113	15	111.21	9	16	2
8	Zhou, W.	ESCP Business School	France	18	928	16	51.56	5	17	0
9	Baesens, B.	KU Leuven	Belgium	16	1365	15	85.31	9	15	0
10	Fan, W.	U Iowa	USA	16	1127	15	70.44	5	15	0
11	Shaw, M.J.	U Illinois Urbana-Champaign	USA	15	1323	13	88.20	7	14	1
12	Holsapple, C.W.	U Kentucky	USA	14	949	12	67.79	6	12	0
13	Marsden, J.R.	U Connecticut	USA	14	212	9	15.14	0	8	0
14	Ngai, E.W.T.	Hong Kong Polytechnic U	China	13	2307	12	177.46	8	12	2
15	Liang, T.P.	National Sun Yat-sen U	Taiwan	13	1190	13	91.54	6	13	1
16	Chen, Y.L.	National Central U	Taiwan	13	615	11	47.31	5	12	0
17	Wei, C.P.	National Taiwan U	Taiwan	13	549	11	42.23	5	11	0
18	Koehler, G.J.	U Florida	USA	13	479	9	36.85	3	8	0
19	Lee, J.K.	Xi'an Jiaotong U	China	13	226	9	17.38	0	9	0
20	Lau, R.Y.K.	City U Hong Kong	China	12	562	10	46.83	3	10	0
21	Nunamaker, J.F.	U Arizona	USA	12	430	10	35.83	3	10	0
22	O'Leary, D.E.	U Southern California	USA	12	339	11	28.25	2	11	0
23	Zhao, J.L.	Chinese U Hong Kong	China	12	279	10	23.25	1	11	0
24	Kim, D.J.	U North Texas	USA	11	4370	11	397.27	9	11	3
25	Sharda, R.	Oklahoma State U	USA	11	2173	9	197.55	6	9	2
26	Wei, K.-K.	National U Singapore	Singapore	11	1737	11	157.91	6	11	1
27	Li, Y.M.	National Yang Ming Chiao Tung U	Taiwan	11	711	10	64.64	4	11	0
28	Kauffman, R.J.	Copenhagen Bus Sch	Denmark	11	550	9	50.00	2	9	0
29	Hu, P.J.H.	U Utah	USA	11	529	10	48.09	4	10	0
30	Blanning, R.W.	Vanderbilt U	USA	11	261	7	23.73	3	7	0
31	Lu, J.	U Technology Sydney	Australia	10	2084	10	208.40	7	10	1
32	Chen, R.	Iowa State U	USA	10	846	10	84.60	5	10	0
33	Wallenius, J.	Aalto U	Finland	10	624	8	62.40	3	7	0
34	Varshney, U.	Georgia State U	USA	10	594	9	59.40	3	9	0
35	Mendling, J.	Humboldt U Berlin	Germany	10	575	10	57.50	7	10	0
36	Cheng, H.K.	U Florida	USA	10	565	9	56.50	2	8	0
37	Benitez, J.	Kent State U	USA	10	504	9	50.40	4	9	0
38	Chen, G.	Tsinghua U	China	10	459	9	45.90	2	9	0
39	Pakath, R.	U Kentucky	USA	10	441	8	44.10	2	6	0
40	Yang, C.C.	Drexel U	USA	10	350	7	35.00	3	7	0
41	Lee, R.M.	Florida International U	USA	10	129	6	12.90	1	3	0
42	Vanthienen, J.	KU Leuven	Belgium	9	736	9	81.78	5	9	0
43	Chau, P.Y.K.	Beijing Normal – Hong Kong Baptist U	China	9	690	8	76.67	6	8	0
44	Ma, J.	City U Hong Kong	China	9	650	8	72.22	4	8	0
45	Zhao, K.	U North Carolina Charlotte	USA	9	648	9	72.00	1	9	0
46	Abrahams, A.S.	Virginia Polytech Inst State U	USA	9	619	8	68.78	4	8	0
47	Zhao, H.	U Wisconsin–Milwaukee	USA	9	596	8	66.22	5	8	0
48	Yen, D.C.	Texas Southern U	USA	9	541	9	60.11	3	9	0
49	Chau, M.	U Hong Kong	China	9	527	9	58.56	4	9	0
50	Sen, A.	Texas A&M U	USA	9	358	6	39.78	3	5	0

Abbreviations: R = Rank; TP and TC = Total papers and citations; H = *h*-index; C/P = Citations per paper; ≥50, ≥10 = Number of papers with equal or more than 50 and 10 citations; T50 = Number of papers in Table 4.

of citing articles to DSS journal, which also indicates their leading positions in global research outputs. Taiwan and Australia also get very remarkable results obtaining the fifth and sixth positions, respectively. Apart from China and India, some other developing countries/territories are also among the top 20 that have cited the journal very frequently, including Iran, Malaysia, Turkey, Brazil, Saudi Arabia, and Indonesia.

Next, we analyze the journals that have published the citing articles to DSS journal and the associated keywords indexed in Scopus. Table 7 presents the top 40 journals and keywords with the highest number of papers citing the DSS journal.

Self-citations of DSS journal are the most significant ones. This phenomenon is common for many journals mainly because previous articles published in a journal usually influence a lot on future research within the same journal [9,11,48]. *Expert Systems with Applications*, *Sustainability*, *IEEE Access*, and the *European Journal of Operational Research* are also among the top five journals that cite the DSS journal more frequently, with 1950, 1451, 1109, and 971 papers, respectively. Most of the journals in the list are from the fields of OR&MS, computer science, engineering, business, and information science. It is important to know that large-sized journals tend to give more citations to DSS journal owing to a large number of papers published, such as *Sustainability*, *IEEE Access*, *Applied Sciences*, and *PLOS One*. In terms of the keywords related to the citing articles to DSS journal, "Decision Making" leads the list with 9765 papers, distantly followed by "Decision Support Systems", "Artificial Intelligence", and "Data Mining". Note that the top 40 keywords are related to diverse topics and align with the research scope of DSS journal, which also reflects the interdisciplinary nature of the journal.

2.3. Leading authors, institutions, and countries/territories

This section provides a general overview of the DSS journal's leading authors, institutions, and countries/territories according to the bibliographic information collected from the Scopus database. The total

Table 9
Temporal evolution of the most productive authors.

R	Author	TP	TC	R	Author	TP	TC
1985–1993				2004–2013			
1	Nunamaker, J.F.	8	352	1	Chen, H.	30	2279
2	Blanning, R.W.	7	208	2	Rao, H.R.	19	4376
3	Jarke, M.	7	196	3	Bose, I.	12	1327
4	Whinston, A.B.	6	333	4	Piramuthu, S.	12	572
5	Shaw, M.J.	6	160	5	Fan, W.	11	682
6	Konsynski, B.R.	5	164	6	Wei, C.P.	11	526
7	Holsapple, C.W.	5	136	7	Delen, D.	9	1428
8	Lee, R.M.	5	104	8	Yen, D.C.	9	541
9	Kimbrough, S.O.	5	88	9	Zhou, W.	9	504
10	Dolk, D.R.	4	166	10	Wei, K.-K.	8	1579
1994–2003				2014–2023			
1	Chen, H.	9	621	1	Delen, D.	18	822
2	Whinston, A.B.	9	555	2	Bose, I.	17	827
3	Lee, J.K.	9	140	3	Luo, X.	15	646
4	Shaw, M.J.	6	925	4	Piramuthu, S.	15	576
5	Bui, T.X.	6	295	5	Baesens, B.	11	758
6	Kiang, M.Y.	5	405	6	Benitez, J.	10	504
7	Lee, R.M.	5	25	7	Zhou, W.	9	424
8	Liang, T.P.	4	630	8	Lu, J.	8	1774
9	Turban, E.	4	283	9	Feuerriegel, S.	8	805
10	Watson, H.J.	4	159	10	Xu, W.	7	557

Abbreviations: R = Rank; TP and TC = Total papers and citations.

number of DSS journal's publications and total citations regarding each actor are the two primary indicators to evaluate the productivity and influence of an actor in the journal. Note that the ranking of authors, institutions, or countries/territories depends on the total number of DSS publications, and in case of a tie, the total number of citations received by the associated publications is further considered.

First, let us analyze the top 50 leading authors in the journal, and Table 8 presents the results. The table considers seven bibliometric indicators, including the total number of papers, the citations these papers have obtained, the *h*-index, the citations per paper, the number of papers with equal or more than 10 and 50 citations, and the number of papers within the top 50 most cited ones listed in Table 4. It is important to note that Scopus uses full counting which gives one unit equally for each participating author of a paper. Considering that using fractional counting can also result in other related limitations, this study follows the approach provided by Scopus. In the table, the current institution and country/territory where an author is working are also presented (the data are obtained directly from Scopus).

Hsinchun Chen, from the University of Arizona (USA), is the most productive author in DSS journal with 41 papers and the third most cited author with 2951 citations. He also performs very well regarding the rest of the indicators. The second position goes to Indranil Bose from NEOMA Business School (France) with 31 papers and 2167 citations, closely followed by Selwyn Piramuthu, from the University of Florida (USA), who has also published 31 papers in the journal but obtained 1310 citations in total. The most cited author in the journal is H. Raghav Rao, affiliated with the University of Texas at San Antonio (USA), who has received 4834 citations with 26 papers. Observe that each of the top five most productive authors has an *h*-index equal to or more than 20. When looking at the "citations per paper" category, Dan J. Kim, from the University of North Texas (USA), leads the list with a ratio of 397.27, followed by Jie Lu from the University of Technology Sydney (Australia) with 208.4 citations per paper in DSS journal and Ramesh Sharda from Oklahoma State University (USA) with 197.55.

In addition, Dursun Delen, affiliated with Oklahoma State University (USA), has the highest number of DSS publications that have been cited equal or over 50 citations (i.e., 16 papers), and Hsinchun Chen has the most papers equal or over 10 citations (i.e., 39 papers). Moreover, for the top 50 leading authors, Dan J. Kim has three papers among the top 50 most cited papers in the journal (as listed in Table 4), H. Raghav Rao, Xin (Robert) Luo (from the University of New Mexico, USA), Eric W.T. Ngai (from the Hong Kong Polytechnic University, China), and Ramesh Sharda have two each, and another eight authors have one each. It is worth noting that 11 authors in the list are also among the top 40 authors who cite most frequently the DSS journal (as shown in Table 6).

There are some other interesting results from Table 8. For example, the top 50 leading authors in the journal come from 11 countries/territories around the world, and of these, 28 authors are from the USA and eight from China. Additionally, the University of Florida (USA) has three leading authors on the list, and the University of Arizona, the University of Kentucky, KU Leuven (Belgium), and the City University of Hong Kong (China) have two each. It is worth mentioning that Andrew B. Whinston and James R. Marsden, the previous Editors-in-Chief of DSS journal, are in the top 50 list, and 14 authors are current members of the Editorial Board of the journal, including Jae Kyu Lee, H. Raghav Rao, and Ramesh Sharda in the Editorial Advisory Board, Alan S. Abrahams, Jose Benitez, Indranil Bose, Hsing Kenneth Cheng, Dan J. Kim, Xin (Robert) Luo, Chih-Ping Wei, and J. Leon Zhao as Senior Editors, and Rui Chen, Eric W.T. Ngai, and Wei Zhou as Associate Editors.

To investigate how the leading authors have changed in terms of productivity and influence through time, we conduct a temporal analysis considering four periods between 1985 and 2023: 1985–1993, 1994–2003, 2004–2013, and 2014–2023. Table 9 shows the results of the top 10 most productive authors in DSS journal for each period.

During earlier years between 1985 and 1993, Jay F. Nunamaker, from the University of Arizona, was the leading author with eight publications and 352 citations, followed by Robert W. Blanning (affiliated with Vanderbilt University, USA) having seven publications and 208 citations. Andrew B. Whinston, ranked in the fourth position, has received more than 300 citations with six papers published in the period 1985–1993. From 1994 to 2003, Hsinchun Chen emerged as the leading author with nine publications and 621 citations. Andrew B. Whinston and Jae Kyu Lee (currently from Xi'an Jiaotong University, China), being in the second and third positions during this period, respectively, have also published nine papers in DSS journal. Note that Michael J. Shaw (from the University of Illinois at Urbana-Champaign, USA) and Ting-Peng Liang (from National Sun Yat-sen University, Taiwan) have each published a highly cited paper in this period among the top 50 most cited in the journal (see Table 4).

For the period between 2004 and 2013, Hsinchun Chen maintained his leading position as the most productive author in the journal with 30 publications, and H. Raghav Rao was the most influential author among the top 10, with two highly cited papers ranked in the top 50 list. Additionally, four authors among the top 10 during this time have also contributed to the top 50 most cited papers in DSS journal with one paper each, including Hsinchun Chen, Indranil Bose, Dursun Delen, and Kwok-Kee Wei (from the National University of Singapore, Singapore).

For the recent decade from 2014 to 2023, Dursun Delen has become the most productive author with 18 papers, rising six places since the previous decade. Indranil Bose has also become more productive in the journal, achieving second place for the period of 2014–2023. Notably, Jie Lu has been very influential during this period and obtained 1774 citations with eight publications (one of which is among the top 50 most cited papers in the journal). It is worth noting that Selwyn Piramuthu has also obtained remarkable results in DSS journal, being the fourth most productive author for the periods of 2004–2013 and 2014–2023.

Another interesting issue is to analyze the most productive and influential institutions in the journal. Note that the institutions analyzed here are those with which the authors were affiliated at the time of publication of their papers in DSS journal. Table 10 presents the top 50 leading institutions in the journal. The table considers multiple bibliometric indicators to provide a complete perspective of the publication and citation structure of an institution, including the total number of papers and citations, the *h*-index, the citations per paper, the number of papers with equal or more than 10, 50, and 200 citations, the number of papers in the top 50 of Table 4, and the university rankings according to the Academic Ranking of World Universities (ARWU) 2024 and the

Table 10
The most productive and influential institutions in DSS journal.

R	Institution	Country/ Territory	TP	TC	H	C/P	≥200	≥50	≥10	T50	QS	ARWU
1	City U Hong Kong	China	96	11,682	46	121.69	18	46	90	5	62	101–150
2	U Arizona	USA	92	4988	41	54.22	4	31	78	1	293	151–200
3	U Florida	USA	68	4608	29	67.76	2	17	57	1	215	101–150
4	U Connecticut	USA	59	2409	25	40.83	2	11	41	0	565	301–400
5	Erasmus U Rotterdam	Netherlands	55	2415	26	43.91	1	15	43	1	158	101–150
6	Korea Advanced Inst Sci Tech	South Korea	54	1888	20	34.96	2	10	37	0	53	201–300
7	Oklahoma State U	USA	53	5318	33	100.34	7	28	46	3	851–900	501–600
8	U Buffalo SUNY	USA	49	6189	31	126.31	5	22	42	2	466	401–500
9	Arizona State U	USA	47	2474	22	52.64	1	10	38	1	200	151–200
10	Hong Kong Polytechnic U	China	45	6334	32	140.76	10	24	42	5	57	151–200
11	Virginia Polytechnic Inst State U	USA	44	2288	23	52.00	2	11	42	0	389	201–300
12	U Texas Austin	USA	43	3308	23	76.93	3	18	30	1	66	45
13	Georgia State U	USA	43	2036	24	47.35	1	10	37	0	851–900	501–600
14	National U Singapore	Singapore	40	3625	25	90.63	2	17	36	2	8	68
15	Chinese U Hong Kong	China	40	1829	20	45.73	2	9	32	0	36	101–150
16	Purdue U	USA	38	1050	21	27.63	0	8	25	0	89	100
17	U Kentucky	USA	35	2679	22	76.54	3	11	29	1	791–800	301–400
18	U Illinois Urbana-Champaign	USA	35	2353	21	67.23	2	11	29	2	69	55
19	Carnegie Mellon U	USA	35	1428	21	40.80	0	11	30	0	58	101–150
20	Texas Tech U	USA	34	2287	20	67.26	2	11	29	1	781–790	401–500
21	U Maryland College Park	USA	34	1851	21	54.44	2	11	28	0	218	58
22	Pennsylvania State U	USA	32	2526	23	78.94	4	15	28	1	89	101–150
23	Tsinghua U	China	32	1266	20	39.56	0	7	27	0	20	22
24	U Hong Kong	China	31	2642	24	85.23	3	16	27	1	17	69
25	Hong Kong U Sci Tech	China	31	2362	19	76.19	4	8	24	1	47	201–300
26	KU Leuven	Belgium	31	1844	22	59.48	2	12	25	0	63	78
27	U Wisconsin–Milwaukee	USA	30	2512	21	83.73	2	14	27	1	1201–1400	801–900
28	U Southern California	USA	30	1631	17	54.37	3	10	24	0	125	62
29	National Sun Yat-sen U	Taiwan	29	2281	20	78.66	2	10	25	1	485	601–700
30	National Taiwan U	Taiwan	29	2002	20	69.03	2	10	25	1	68	201–300
31	National Cheng Kung U	Taiwan	29	1301	16	44.86	2	6	24	0	215	401–500
32	U South Florida	USA	29	900	15	31.03	1	5	20	0	621–630	301–400
33	Eindhoven U Technology	Netherlands	28	1489	20	53.18	1	10	24	0	136	401–500
34	National Central U	Taiwan	27	4266	22	158.00	2	16	25	1	641–650	901–1000
35	U Michigan	USA	27	1468	20	54.37	1	12	24	0	44	30
36	National Yang Ming Chiao Tung U	Taiwan	27	1378	20	51.04	1	8	25	0	219	401–500
37	Chinese Academy Sciences	China	26	1655	20	63.65	1	9	25	1	–	–
38	Georgia Inst Technology	USA	26	1202	19	46.23	1	8	21	0	114	151–200
39	Xi'an Jiaotong U	China	25	1450	19	58.00	1	7	23	0	295	95
40	Renmin U China	China	25	1404	18	56.16	2	7	23	0	621–630	301–400
41	Iowa State U	USA	25	1004	17	40.16	0	6	20	0	470	501–600
42	Miami U	USA	25	947	16	37.88	0	6	20	0	1201–1400	–
43	U Rochester	USA	25	934	14	37.36	1	5	19	0	236	151–200
44	Queensland U Technology	Australia	24	3768	19	157.00	1	8	23	1	213	201–300
45	National Chung Cheng U	Taiwan	24	1717	20	71.54	1	11	23	0	1001–1200	–
46	U Southampton	UK	23	1733	22	75.35	2	11	23	0	80	151–200
47	National Chengchi U	Taiwan	23	938	14	40.78	0	5	18	0	601–610	–
48	U Pennsylvania	USA	23	924	13	40.17	0	6	18	0	11	14
49	Nanyang Technological U	Singapore	23	894	16	38.87	1	6	19	0	15	90
50	Indian Inst Management Calcutta	India	22	1473	17	66.95	1	9	17	0	–	–

Abbreviations: R = Rank; TP and TC = Total papers and citations; H = *h*-index; C/P = Citations per paper; ≥200, ≥50, ≥10 = Number of papers with equal or more than 200, 50, and 10 citations; T50 = Number of papers in Table 4; QS = Quacquarelli & Symonds World University Rankings 2025; ARWU = Academic Ranking of World Universities 2024.

Quacquarelli & Symonds (QS) World University Rankings 2025. It is worth noting that Scopus uses full counting. Therefore, all the co-authoring institutions of a paper get one unit independently of the number of co-authors and the number of co-authors from the same institution.

The City University of Hong Kong is by far the most productive institution in DSS journal with 96 publications, followed by the University of Arizona (92 publications) and the University of Florida (68 publications). In addition, among the top 50 most productive institutions, City University of Hong Kong is the most cited and influential institution and has received 11,682 citations, well ahead of the second and third most cited institutions, i.e., the Hong Kong Polytechnic University (6334 citations) and the University at Buffalo SUNY (6189 citations). It also performs the best regarding the *h*-index (46), the number of papers with equal or more than 10, 50, and 200 citations (90, 46, and 18 papers, respectively), and the number of papers in the top 50 most cited in DSS journal (five papers).

Note that the Hong Kong Polytechnic University has also obtained good performances with 10 papers achieving 200 citations and five ranked into the top 50 most cited list. Looking at the "citations per paper" category, National Central University (Taiwan) and Queensland University of Technology (Australia) have achieved remarkable results with an average of more than 150 citations per paper, although they are ranked in the second half of the list on productivity.

The top 50 institutions in the list are from 10 countries/territories, among which 25 are from the USA, nine from China, and seven from Taiwan. Most of the leading universities in the journal are in the top 500 of the world university rankings. Particularly, 13 of the universities are in the top 100 according to the ARWU 2024, and 19 are in the top 100 based on the QS World University Rankings 2025 (five enter the top 20). From this perspective, DSS journal is having a significant impact on research among the world's leading universities.

Table 11
Temporal evolution of the most productive institutions.

R	Institution	TP	TC	R	Institution	TP	TC
	1985–1993				2004–2013		
1	U Arizona	13	462	1	City U Hong Kong	58	7661
2	Purdue U	10	335	2	U Arizona	44	2985
3	New York U	9	256	3	U Florida	37	3563
4	Vanderbilt U	8	237	4	U Connecticut	33	1831
5	U Pennsylvania	8	219	5	U Buffalo SUNY	31	5324
6	Carnegie Mellon U	7	320	6	Hong Kong Polytechnic U	29	5341
7	U Texas Austin	7	263	7	Virginia Polytechnic Inst State U	27	1492
8	U Illinois Urbana-Champaign	7	164	8	Chinese U Hong Kong	27	1229
9	Naval Postgraduate School	6	209	9	Oklahoma State U	24	2650
10	U Kentucky	6	158	10	U Hong Kong	24	2240
	1994–2003				2014–2023		
1	Korea Advanced Inst Sci Tech	24	715	1	City U Hong Kong	31	3167
2	U Arizona	17	1005	2	Oklahoma State U	24	1130
3	U Texas Austin	17	673	3	KU Leuven	22	1110
4	U Illinois Urbana-Champaign	16	1642	4	Renmin U China	19	989
5	Georgia State U	14	828	5	U Florida	19	835
6	Hong Kong U Sci Tech	13	516	6	U Arizona	18	543
7	Arizona State U	12	1480	7	Indian Inst Management Calcutta	17	815
8	Carnegie Mellon U	11	393	8	Hong Kong Polytechnic U	16	1005
9	U Maryland College Park	11	298	9	Xi'an Jiaotong U	16	683
10	U California Berkeley	10	617	10	U New Mexico	16	681

Abbreviations: R = Rank; TP and TC = Total papers and citations.

We also investigate the most productive institutions in the journal over time. A temporal analysis is implemented considering the four periods: 1985–1993, 1994–2003, 2004–2013, and 2014–2023. Table 11 presents the top 10 most productive institutions for each period.

The University of Arizona has the largest presence in DSS journal throughout the entire period of 1985–2023. For the first years of the journal between 1985 and 1993, the University of Arizona was the most productive and influential institution, with 13 publications and 462 citations, and it is closely followed by Purdue University (USA), having 10 papers published in DSS journal and 335 citations received. During the period 1994–2003, the Korea Advanced Institute of Science and Technology (South Korea) became the most productive institution with 24 publications. The University of Arizona and the University of Texas at Austin (USA) were tied for the second most productive institutions for this period, with 17 publications each. Moreover, the University of Illinois at Urbana-Champaign, Arizona State University, and the University of Arizona have received more than 1000 citations each during this time. Note that the University of Texas at Austin and the University of Illinois at Urbana-Champaign gained more importance in the period 1994–2003, both rising four places since the previous phase.

The period 2004–2013 has seen a significant increase either in productivity or in the influence of the top 10 institutions in the journal; each of the top 10 institutions has more than 20 publications and over 1000 citations. City University of Hong Kong emerged as the leading institution in this period with the highest number of publications (58 papers) and citations (7661 citations). Notably, the top four most productive institutions during the period 2004–2013 are the same as the top four institutions in Table 10: City University of Hong Kong, the University of Arizona, the University of Florida, and the University of Connecticut (USA).

Focusing on the recent decade 2014–2023, City University of Hong Kong has been maintaining its leading position in the journal with 31 publications and 3167 citations, which is followed by Oklahoma State University and KU Leuven. Observe that recently, the University of Arizona has been reduced to sixth position in the ranking. Additionally, it is interesting to find that during the first period (1985–2023), all the top 10 institutions are from the USA, but such dominance degree has reduced over time with the performances of institutions from other countries/territories getting more prominent in DSS journal, especially those from China.

Next, we look into the journal's publications at the country/territory level. Note that the analysis focuses on the country/territory of an author's affiliation at the time of publication. Similarly to the institution analysis, due to the full counting used in Scopus, all the co-authoring countries/territories of a paper receive one unit independently of the number of co-authors and the number of co-authors from the same country/territory. Table 12 shows the 50 most productive and influential countries/territories in DSS journal. This table analyzes the total number of papers and citations, the *h*-index, the citations per paper, the number of papers with equal or more than 10 and 100 citations, the number of papers in the top 50 of Table 4, the population of a country/territory, and the publications and citations per million inhabitants.

The USA leads the journal as the most productive and influential country/territory, with 1795 papers and 110,016 citations. The USA also performs the best in terms of the *h*-index (151), the number of publications with equal or more than 10 and 100 citations (1449 and 263 papers, respectively), and the number of papers in the top 50 of Table 4 (27 papers), indicating that the USA has significantly contributed to most of the influential papers of DSS journal. China is ranked in the second position with 535 papers and 42,118 citations, achieving an average of 78.73 citations per paper which is over the value of the USA. In addition, China performs very well regarding the *h*-index (107) and has 15 papers among the top 50 most cited in the journal, 112 papers with equal or more than 100 citations, and 465 papers with at least 10 citations.

Taiwan has obtained remarkable publication and citation results and is ranked in the third position among the 50 leading countries/territories. The fourth and fifth positions go to the UK and Germany, respectively. Five countries/territories have attained a value of more than 100 citations per paper, including Singapore, Portugal, Malaysia, Slovenia, and Jordan. Moreover, Singapore and Taiwan are the top two in terms of the "publications per million inhabitants" and "citations per million inhabitants" categories. Note that among the top 20 in the list, half of them are European countries/territories, and seven are from Asia. Many developing countries/territories enter the top 50, although most of them are ranked in the rear half of the list. The results from the table also reflect the DSS journal's diversity of regional distribution, with researchers worldwide disseminating its content.

Next, let us analyze the publication evolution of the countries/territories through time. Table 13 presents the temporal evolution results of the top 30 countries/territories in DSS journal. Note that in the table, the total number of publications of each country/territory for the four periods are analyzed respectively: 1985–1993, 1994–2003, 2004–2013, and 2014–2023. The annual number of papers published by each of the top 10 countries/territories between 1985 and 2023 is also presented, and for the remaining countries/territories in the table, only the annual number of papers published between 2007 and 2023 is considered.

The USA has always been in the leading position for all four periods,

Table 12
The most productive and influential countries/territories in DSS journal.

R	Country/ Territory	TP	TC	H	C/P	≥100	≥10	T50	Population	P/Pop	C/Pop
1	USA	1795	110,016	151	61.29	263	1449	27	343,477,335	5.23	320.30
2	China	535	42,118	107	78.73	112	465	15	1,422,584,933	0.38	29.61
3	Taiwan	262	18,764	68	71.62	43	227	5	23,420,442	11.19	801.18
4	UK	189	10,822	57	57.26	29	163	0	68,682,962	2.75	157.56
5	Germany	181	8393	49	46.37	17	137	1	84,548,231	2.14	99.27
6	South Korea	157	7657	47	48.77	21	121	1	51,748,739	3.03	147.96
7	Australia	148	11,438	51	77.28	22	134	2	26,451,124	5.60	432.42
8	Canada	142	10,097	51	71.11	31	118	2	39,299,105	3.61	256.93
9	Netherlands	142	6085	46	42.85	12	114	1	18,092,524	7.85	336.33
10	France	133	7028	48	52.84	21	106	1	66,438,822	2.00	105.78
11	Spain	107	5101	43	47.67	14	91	0	47,911,579	2.23	106.47
12	Singapore	90	9170	41	101.89	16	79	4	5,789,090	15.55	1584.01
13	India	86	4426	37	51.47	13	65	0	1,438,069,596	0.06	3.08
14	Belgium	76	4590	37	60.39	12	64	0	11,712,893	6.49	391.88
15	Italy	67	2961	29	44.19	7	52	0	59,499,453	1.13	49.77
16	Turkey	44	1812	24	41.18	5	38	0	87,270,501	0.50	20.76
17	Israel	37	1283	19	34.68	4	24	0	9,256,314	4.00	138.61
18	Austria	33	1666	22	50.48	3	30	0	9,130,429	3.61	182.47
19	Portugal	32	4002	23	125.06	10	30	2	10,430,738	3.07	383.67
20	Finland	32	2581	19	80.66	4	26	1	5,601,185	5.71	460.80
21	Switzerland	31	1738	21	56.06	5	27	0	8,870,561	3.49	195.93
22	Japan	31	671	14	21.65	1	15	0	124,370,947	0.25	5.40
23	Brazil	29	1613	17	55.62	3	23	0	211,140,729	0.14	7.64
24	Greece	27	1041	18	38.56	1	21	0	10,242,908	2.64	101.63
25	New Zealand	26	947	16	36.42	2	22	0	5,172,836	5.03	183.07
26	Poland	22	1113	17	50.59	3	22	0	38,762,844	0.57	28.71
27	Chile	18	1011	14	56.17	1	16	0	19,658,835	0.92	51.43
28	Sweden	18	901	14	50.06	3	14	0	10,551,494	1.71	85.39
29	Denmark	18	872	15	48.44	1	17	0	5,948,136	3.03	146.60
30	Iran	16	453	12	28.31	0	16	0	90,608,707	0.18	5.00
31	Ireland	13	650	11	50.00	2	11	0	5,196,630	2.50	125.08
32	Norway	13	371	10	28.54	1	10	0	5,519,167	2.36	67.22
33	Malaysia	9	962	8	106.89	3	8	1	35,126,298	0.26	27.39
34	Slovenia	9	951	7	105.67	3	7	0	2,118,396	4.25	448.92
35	UAE	9	569	9	63.22	2	9	0	10,642,081	0.85	53.47
36	South Africa	9	263	7	29.22	0	7	0	63,212,384	0.14	4.16
37	Mexico	8	404	8	50.50	1	8	0	129,739,759	0.06	3.11
38	Russia	8	127	6	15.88	0	4	0	145,440,500	0.06	0.87
39	Saudi Arabia	7	441	7	63.00	1	7	0	33,264,292	0.21	13.26
40	Colombia	7	290	7	41.43	0	6	0	52,321,152	0.13	5.54
41	Hungary	7	152	6	21.71	0	5	0	9,686,463	0.72	15.69
42	Serbia	5	283	5	56.60	1	5	0	6,773,201	0.74	41.78
43	Czech Rep	4	290	4	72.50	1	4	0	10,809,716	0.37	26.83
44	Tunisia	4	193	4	48.25	1	4	0	12,200,431	0.33	15.82
45	Thailand	4	75	3	18.75	0	3	0	71,702,435	0.06	1.05
46	Cuba	3	119	3	39.67	0	3	0	11,019,931	0.27	10.80
47	Romania	3	110	3	36.67	0	3	0	19,118,479	0.16	5.75
48	Qatar	3	97	3	32.33	0	3	0	2,979,082	1.01	32.56
49	Argentina	3	95	3	31.67	0	3	0	45,538,401	0.07	2.09
50	Jordan	2	393	2	196.50	2	2	0	11,439,213	0.17	34.36

Abbreviations: R = Rank; TP and TC = Total papers and citations; H = *h*-index; C/P = Citations per paper; ≥100, ≥10 = Number of papers with equal or more than 100 and 10 citations; T50 = Number of papers in Table 4; P/Pop and C/Pop = Papers and citations per million inhabitants.

and especially during the period 2004–2013, the number of papers published in DSS journal by the USA achieved a record of 765. China shows a remarkable growth trajectory of its publication in the journal, increasing the productivity from only two papers published in the period 1985–1993 to 262 (ranked in the second position) during the recent decade between 2014 and 2023. It is worth noting that the gap between the USA and China in the aspect of the annual number of publications has been decreasing, particularly in the last few years. In 2023, the productivity of China (39 papers) in the journal has first overtaken that of the USA (34 papers). From this point of view, it is expected that China will continue increasing the annual number of journal publications and play a more prominent role in the journal.

Overall, most of the countries/territories have increased their publications in the journal over time, especially due to the significant growth of DSS journal. Note that in the first years from 1985 to 1993, Germany published the second most papers (i.e., 24 papers), and its productivity has improved very quickly during the recent decade, with 103 papers published in the journal. However, several developed countries/territories have shown a downward trend in productivity recently, such as the USA, Taiwan, South Korea, Spain, and Singapore. For example, Taiwan was ranked in the third position during the period 2004–2013 with 151 papers, but the number of its publications in the journal has reduced to 80 in the last decade, with no more than 10 papers each year more recently. With the development of DSS journal, there is a tendency for many countries/territories which will participate more frequently in the future.

Finally, we focus on analyzing the publications of DSS journal between 1985 and 2023 from the perspective of supranational regions. The main aim of this analysis is to provide a general picture of the productivity and influence of different geographical regions in the journal. Six supranational regions are considered in the study: North America, Asia (classified by East Asia and the Rest of Asia), Europe, Oceania, Latin America, and Africa. Table 14 presents the results using similar bibliometric indicators to those in the country/territory analysis of Table 12.

Table 13
Annual number of papers classified by countries/territories.

R	Country/Territory	D1	D2	D3	D4	Total	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	USA	470	765	383	177	1795	101	82	68	64	82	84	81	87	43	45	45	40	46	38	47	45	34
2	China	262	233	38	2	535	19	19	20	13	26	43	55	33	18	21	21	18	26	29	30	27	39
3	Taiwan	80	151	25	6	262	8	25	11	21	14	20	17	23	10	7	6	7	1	3	6	9	8
4	UK	82	61	37	9	189	8	7	2	3	3	11	8	10	5	10	15	11	6	4	7	7	7
5	Germany	103	40	14	24	181	3	4	1	4	8	7	10	9	6	10	13	12	10	14	13	9	7
6	South Korea	42	69	41	5	157	9	5	5	7	7	8	10	8	1	4	1	3	7	8	0	5	5
7	Australia	71	59	15	3	148	6	7	5	2	6	14	11	5	6	6	14	5	8	10	11	6	0
8	Canada	51	54	27	10	142	4	6	9	2	9	7	3	7	8	6	3	5	6	5	2	6	3
9	Netherlands	54	49	22	17	142	5	9	5	1	8	10	5	9	6	4	10	4	5	3	6	4	3
10	France	68	46	15	4	133	4	0	3	3	7	10	13	5	9	0	3	6	4	8	10	15	8
11	Spain	49	53	5	0	107	4	8	5	4	4	12	6	6	7	12	3	4	3	5	5	2	2
12	Singapore	27	46	16	1	90	3	3	5	2	7	12	4	7	6	3	2	1	1	3	3	1	0
13	India	50	27	6	3	86	0	3	2	0	5	8	3	6	3	2	5	1	5	9	6	7	6
14	Belgium	47	23	6	0	76	1	3	1	0	3	2	9	1	6	6	12	3	3	2	8	3	3
15	Italy	27	20	12	8	67	2	4	1	1	2	4	5	6	5	1	3	3	4	2	1	2	0
16	Turkey	20	23	1	0	44	1	0	3	0	4	6	4	3	1	3	1	0	2	1	2	6	1
17	Israel	10	16	8	3	37	0	1	2	2	1	2	3	3	0	0	2	1	0	2	0	0	2
18	Austria	15	10	6	2	33	1	0	1	0	0	3	4	1	1	5	2	2	2	0	0	1	1
19	Portugal	13	14	4	1	32	3	1	1	0	4	2	2	2	1	2	1	3	1	1	1	0	1
20	Finland	11	11	7	3	32	3	0	1	1	3	1	1	2	1	3	0	1	1	0	0	2	1
21	Switzerland	16	11	3	1	31	1	1	0	0	0	3	5	3	2	1	2	3	2	1	1	1	0
22	Japan	7	10	12	2	31	2	0	0	1	1	1	2	1	0	1	0	1	0	0	0	3	1
23	Brazil	11	14	3	1	29	3	0	2	1	2	0	4	1	1	0	2	2	0	1	1	1	2
24	Greece	4	9	12	2	27	1	1	1	2	0	1	1	0	0	0	2	0	1	0	1	0	0
25	New Zealand	12	10	4	0	26	0	1	1	1	0	3	1	1	4	0	0	2	2	0	1	1	1
26	Poland	12	9	0	1	22	0	0	0	0	0	3	4	0	4	0	0	2	2	0	2	1	1
27	Chile	11	5	2	0	18	1	0	0	0	2	1	0	0	2	0	2	0	1	3	2	1	0
28	Sweden	11	4	2	1	18	1	0	1	0	0	0	1	1	0	0	3	3	1	1	0	0	2
29	Denmark	11	4	3	0	18	1	1	0	0	1	1	0	1	2	0	2	1	2	2	1	0	0
30	Iran	6	10	0	0	16	1	2	2	0	1	2	0	0	0	0	1	0	0	1	0	3	1
R	Country/Territory	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06
1	USA	12	23	15	19	16	13	10	28	41	31	47	39	40	41	48	40	36	31	30	45	66	92
2	China	0	0	0	0	0	0	0	1	1	0	2	4	4	4	5	4	3	4	8	8	13	17
3	Taiwan	0	0	2	0	0	0	3	0	1	2	1	1	3	5	2	5	0	1	5	12	5	18
4	UK	3	0	3	1	0	0	1	1	0	5	5	1	3	3	4	7	0	5	4	6	3	10
5	Germany	1	0	0	5	5	4	3	3	3	2	2	4	3	2	0	1	0	0	0	1	0	2
6	South Korea	0	0	1	1	0	0	2	0	1	1	2	9	2	4	3	9	5	1	5	8	6	4
7	Australia	0	0	0	0	1	0	2	0	0	2	2	1	0	2	0	0	6	1	1	0	1	7
8	Canada	1	0	0	2	2	1	1	0	3	2	4	3	5	2	6	2	2	0	1	4	2	8
9	Netherlands	2	1	3	6	0	1	1	1	2	3	3	3	1	0	4	2	2	4	0	2	0	4
10	France	1	1	0	0	1	0	1	0	0	7	0	2	1	0	2	1	2	0	0	1	2	3

Abbreviations: R = Rank; D1–D4 represent the number of publications in the following periods, i.e., D1 = 2014–2023, D2 = 2004–2013, D3 = 1994–2003, and D4 = 1985–1993. The exact years 85–23 indicate the number of publications in that year.

Table 14
Publication structure classified by supranational regions.

R	Region	TP	TC	H	C/P	≥200	≥50	T50	Population	P/Pop	C/Pop
1	North America	1894	116,226	155	61.37	98	595	28	380,000,000	4.98	305.86
2	Asia	1210	83,179	139	68.74	82	407	23	4,700,000,000	0.26	17.70
	East Asia	956	67,392	133	70.49	74	326	20	1,600,000,000	0.60	42.12
	Rest of Asia	308	20,173	68	65.50	15	106	5	3,100,000,000	0.10	6.51
3	Europe	985	51,123	106	51.90	39	303	5	750,000,000	1.31	68.16
4	Oceania	172	12,168	53	70.74	6	57	2	31,000,000	5.55	392.52
5	Latin America	68	3552	33	52.24	3	22	0	660,000,000	0.10	5.38
6	Africa	17	599	14	35.24	0	5	0	1,400,000,000	0.01	0.43

Abbreviations: R = Rank; TP and TC = Total papers and citations; H = *h*-index; C/P = Citations per paper; ≥200, ≥50 = Number of papers with equal or more than 200 and 50 citations; T50 = Number of papers in Table 4; P/Pop and C/Pop = Papers and citations per million inhabitants.

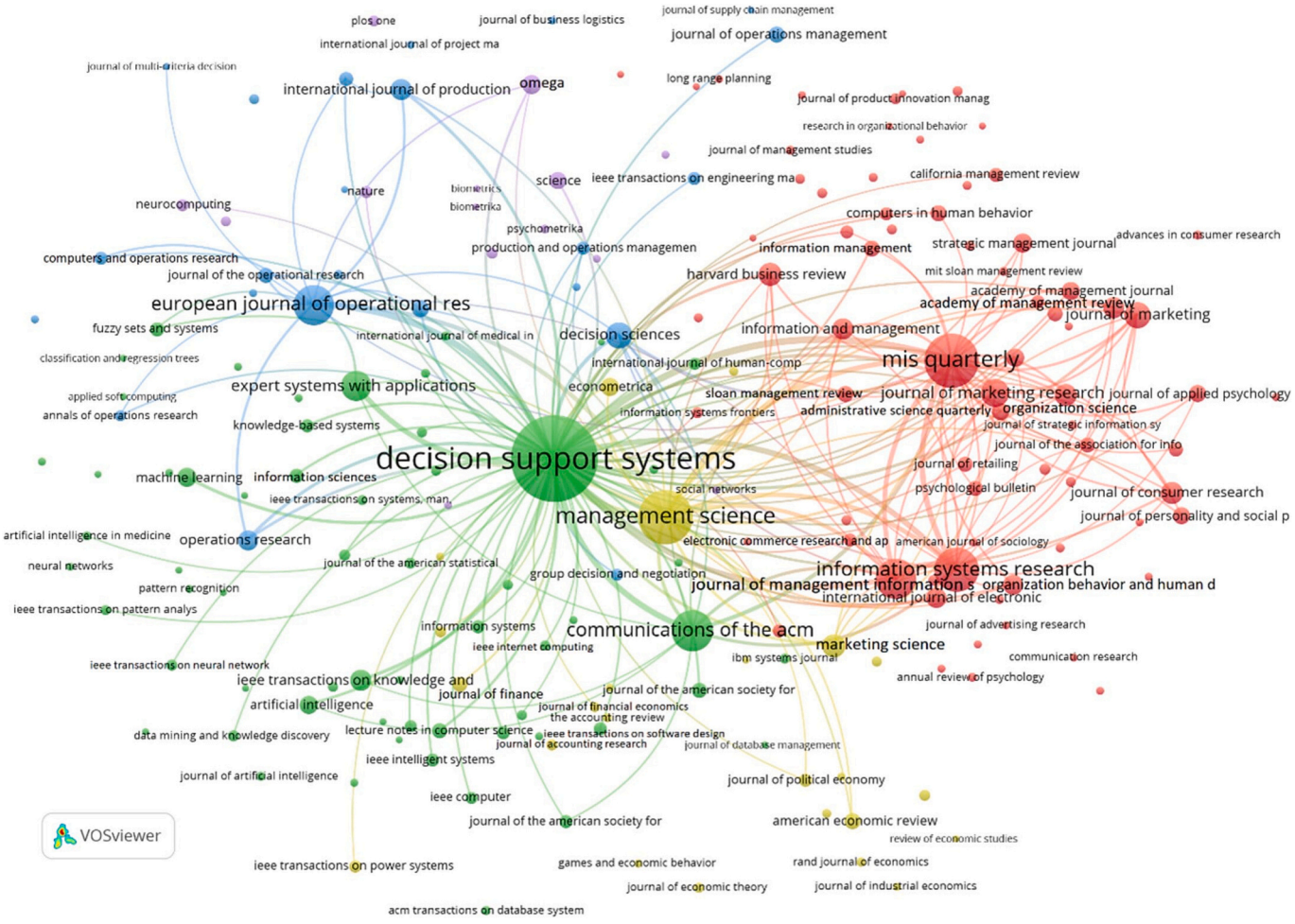

Fig. 4. Co-citation of journals cited in DSS journal: minimum citation threshold of 50 and 200 links.

In the table, the number of papers with equal or more than 50 and 200 citations are considered.

North America is currently the most productive and influential region, followed by Asia and Europe. It also leads the table with respect to the *h*-index, the number of publications with equal or more than 50 and 200 citations, and the number of papers in the top 50 of Table 4. As revealed by Tables 12 and 13, the USA has significantly contributed to the results obtained by North America. Observe that a great part of the journal's Asian publications is from East Asia. Additionally, although Europe has 29 more publications in DSS journal than East Asia, the total number of citations received by the European publications is 16,269 less than that received by the East Asian publications. In terms of the ratio of citations per paper, Oceania performs the best with 70.74, closely followed by East Asia. Note that among the regions in the table, only Africa has the citations per paper less than 50. Under the categories of "publications per million inhabitants" and "citations per million inhabitants", Oceania also leads the table, which is followed by North America. Generally, the journal has publications from all over the world, although the number of publications in Latin America and Africa is very low. With the growth of scientific activities in some developing countries/territories, the importance of their associated regions, especially Asia, is expected to increase in DSS journal.

3. Mapping DSS journal with VOSviewer software

The previous section provides general bibliometric results of the most productive and influential variables in DSS journal. In this section, we focus on investigating the bibliographic connections between the

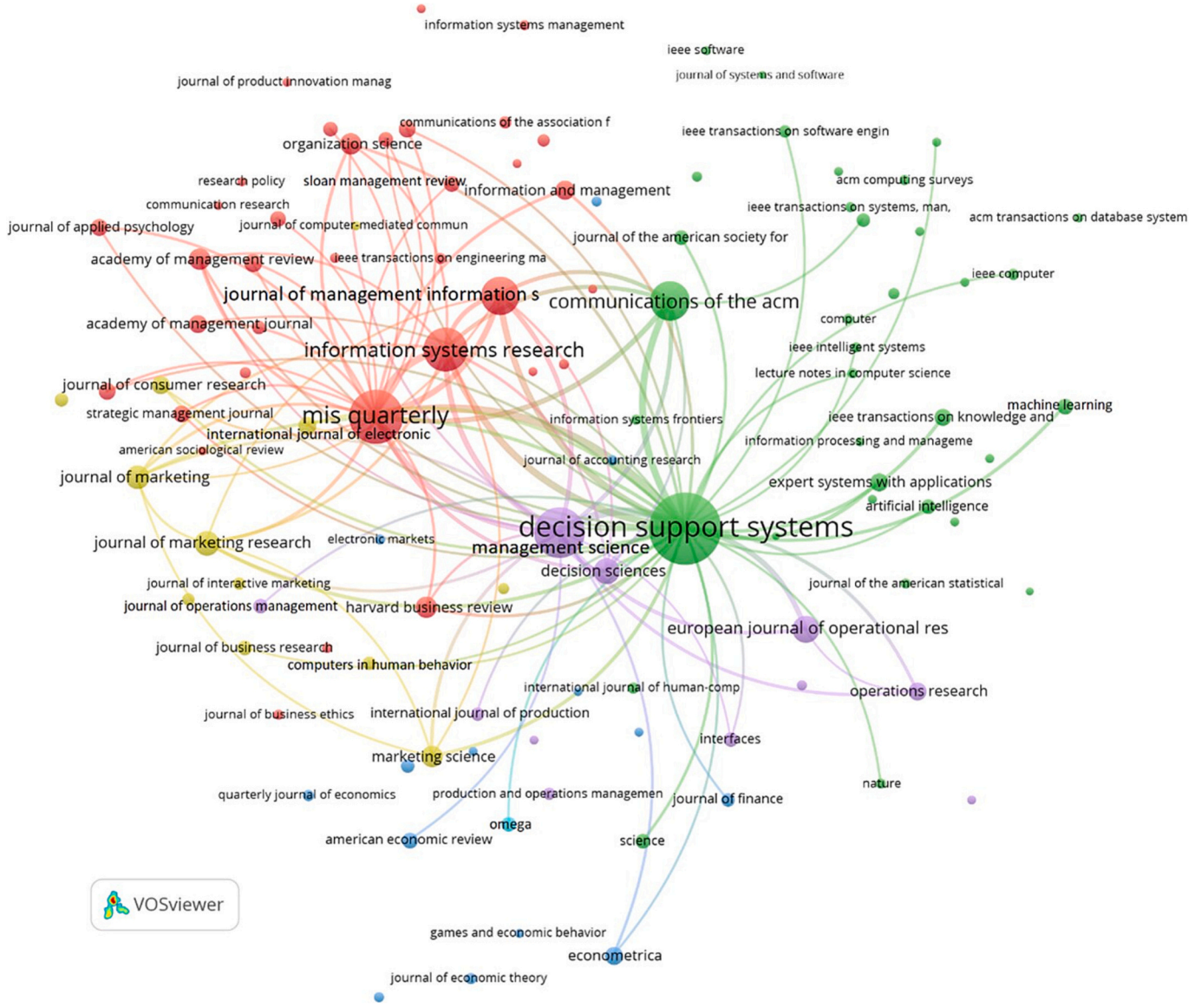

Fig. 5. Co-citation of journals cited in DSS journal: North America (minimum citation threshold of 50 and 100 links).

leading variables (e.g., the authors, institutions, countries/territories, and author keywords in DSS journal, and the journals, documents, and authors cited in DSS journal) to deeply analyze the publication and citation performances of the journal. This is a way to better identify the most frequent trends occurring in the journal and understand how the journal is currently positioned in the scientific community.

For this end, the study uses the VOSviewer software [12] to collect the bibliographic data and generate graphical maps by using bibliometric techniques including co-citation [13], bibliographic coupling [14], and co-occurrence of author keywords [9–11]. The VOSviewer is freely available via www.vosviewer.com. For more details regarding the use of this software, please refer to [12,144]. For ease of the graphical mapping analysis, the bibliographic material analyzed through the VOSviewer software is from the 3537 documents of DSS journal which are directly retrieved from the Scopus database.

To supplement the co-occurrence results of author keywords, this study also analyzes the publication and citation performances concerning the DSS journal's keywords indexed in Scopus. Moreover, to provide a broad picture of the keyword analysis results, we further look into the leading topics and topic clusters in the journal based on the SciVal platform [145] via Scopus. The detailed results are described in the following subsections.

3.1. Co-citation analysis

First, let us start by examining the co-citation of journals cited in DSS journal. For this case, the co-citation of journals occurs when two documents from different journals are cited by the third document published in DSS journal. Fig. 4 illustrates the overall results with a minimum threshold of 50 citations and the 200 most representative co-citation links between the journals cited. Note that the size of a node indicates the number of citations received by a journal only from the DSS journal's publications, and the width of a link represents the strength of the co-citation connection between a pair of journals. Additionally, the color of a node indicates the cluster to which the journal belongs.

The self-citations of DSS journal dominate the map with the largest number of citations in the journal and the deepest network strongly connecting to many other journals around the main topics of DSS journal. Note that such a feature is also very common for most of the journals in the scientific community. In addition, *MIS Quarterly*, *Management Science*, *Information Systems Research*, *Communications of the ACM*, the *European Journal of Operational Research*, and the *Journal of Management*

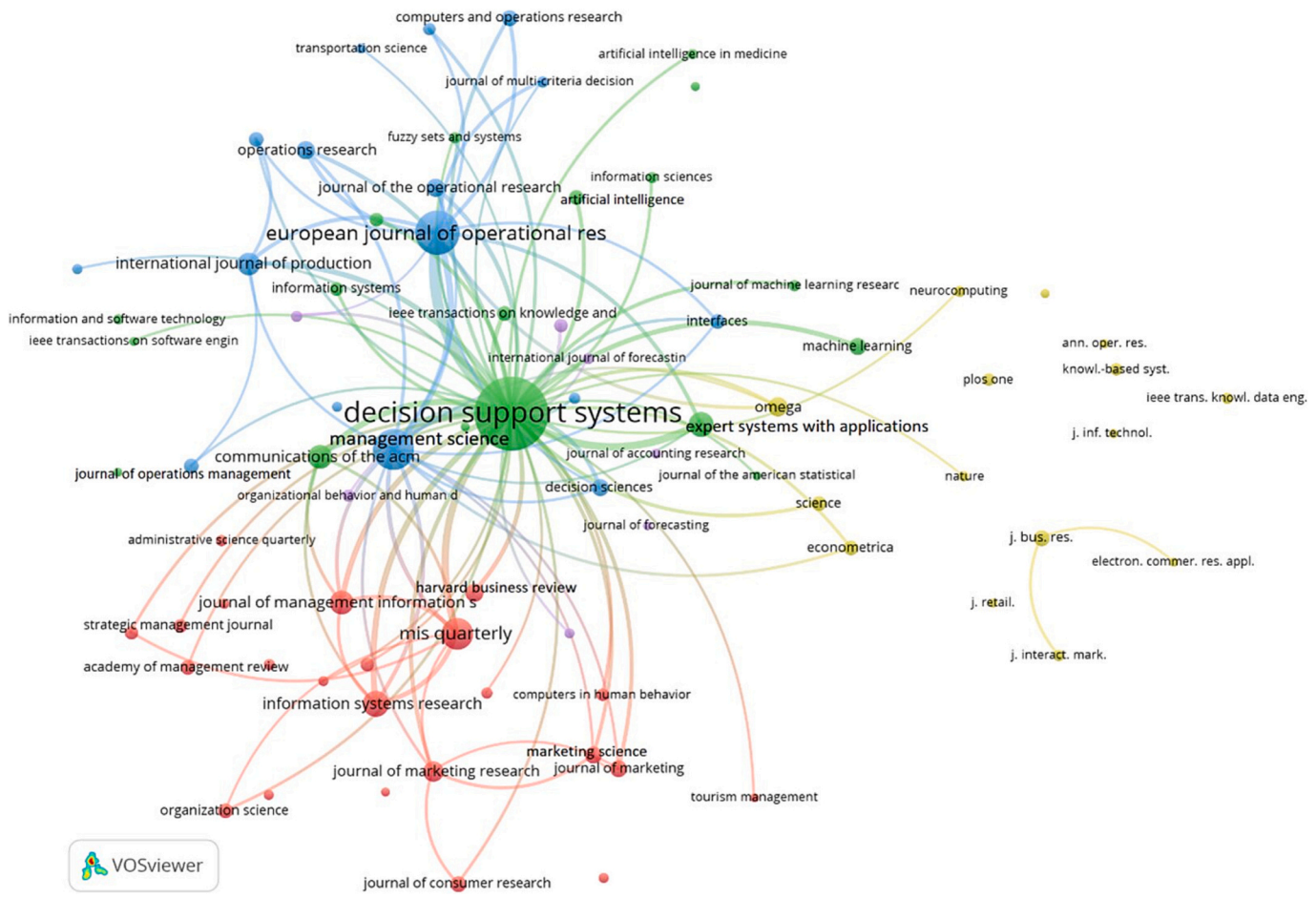

Fig. 6. Co-citation of journals cited in DSS journal: Europe (minimum citation threshold of 30 and 100 links).

Information Systems are also influential journals well cited in DSS journal. An interesting result is that many of the journals in the figure appear as the top 40 journals in Table 7 (e.g., DSS journal itself, the *European Journal of Operational Research*, *Expert Systems with Applications*, and *Information Systems Research*), signifying that some of the influential journals cited by DSS papers are also prone to cite the publications in DSS journal.

It is worth noting that the journals in Fig. 4 are classified into five main clusters. The green cluster collects journals closely related to computer science and engineering, where DSS journal is the most prominent one, followed by *Communications of the ACM* and *Expert Systems with Applications*. Within this cluster, DSS journal is most frequently cited together with *Communications of the ACM* and *Expert Systems with Applications*. The red cluster includes many journals in the fields of management, information science, business, and psychology, represented by *MIS Quarterly*, *Information Systems Research*, the *Journal of Management Information Systems*, and the *Journal of Marketing Research*. Observe that for the red cluster, *MIS Quarterly* is more co-cited with *Information Systems Research* and the *Journal of Management Information Systems* in the DSS papers.

The blue cluster, centered around the *European Journal of Operational Research*, highlights the OR&MS journals that are frequently cited in DSS journal. *Management Science* is the most frequently cited journal in the yellow cluster; however, many of the journals involved in this cluster are in the field of economics, such as *Econometrica* and the *American Economic Review*. Note that *Management Science* appears in yellow because the DSS papers that frequently cite *Management Science* tend to be the papers also citing journals in economics. It is also noticed that in the figure, *Management Science* still has significant connections to management and OR&MS journals, including *MIS Quarterly*, *Information Systems Research*, the *Journal of Management Information Systems*, and the *European Journal of Operational Research*. The cluster in purple is the smallest and most dispersed one shown in this map, collecting the journals like *Omega-International Journal of Management Science*, *Science*, and *Nature*.

Moreover, although the major clusters are more tightly interconnected within, several strongest co-citation links occur between clusters. For example, DSS journal (within the green cluster) is significantly co-cited with *Management Science* (within the yellow cluster), *MIS Quarterly* (within the red cluster), *Information Systems Research* (within the red cluster), and the *European Journal of Operational Research* (within the blue cluster). Therefore, the results from Fig. 4 further confirm the broad research topics and cross-disciplinary research trends of DSS journal.

Another interesting issue is to specifically analyze the co-citation of journals cited in DSS journal by geographical area. In this work, we focus on the four regions divided: North America, Europe, East Asia, and the Rest of the World. Note that these regions depend on the author's affiliation and not on the author's nationality. The corresponding results are shown in Figs. 5–8, respectively. These figures are not connected, and the colors that VOSviewer software generates for each figure are independent.

Fig. 5 visualizes the co-citation of journals that have been cited in the DSS journal's papers by authors working at North American institutions. The graph considers a minimum threshold of 50 citations and the 100 strongest co-citation links.

In North America, self-citations are the most common in DSS journal, followed by *MIS Quarterly*, *Management Science*, *Information Systems*

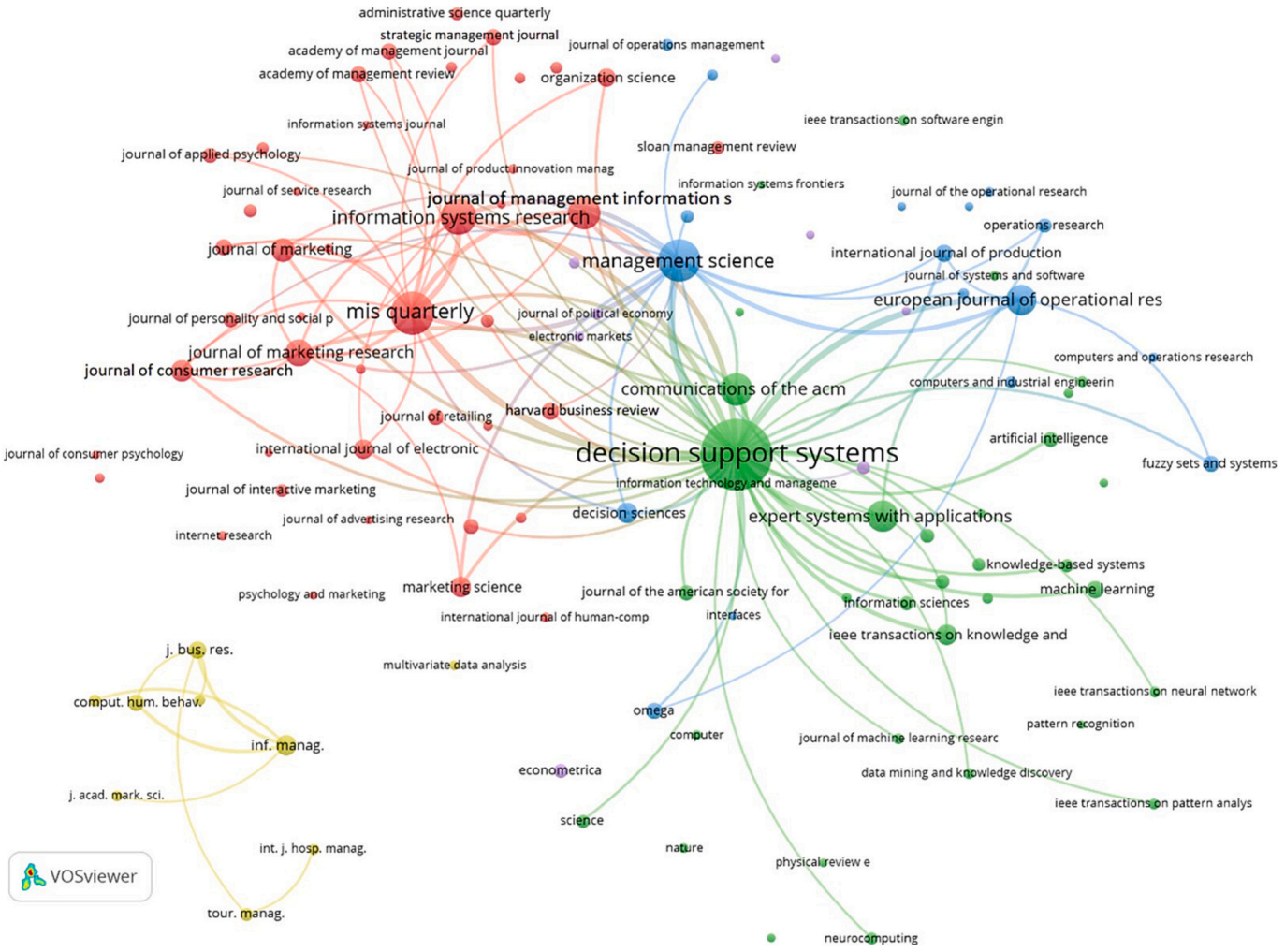

Fig. 7. Co-citation of journals cited in DSS journal: East Asia (minimum citation threshold of 50 and 100 links).

Research, *Communications of the ACM*, and the *Journal of Management Information Systems* that are frequently cited by the journal. The general results from this graph are very similar to those of the overall co-citation of journals in Fig. 4. Note that the top five most cited journals by the DSS publications affiliated with North America are the same as the global results. In addition, there are strong co-citation connections among these top five journals.

The green and red clusters are the most prominent in the graph, and they are significantly interconnected. Specifically, the green cluster, including DSS journal and *Communications of the ACM*, mainly groups computer science and engineering journals, while in the red cluster, many journals are connected to the fields of management and information science, led by *MIS Quarterly*, *Information Systems Research*, and the *Journal of Management Information Systems*. The purple cluster collects several influential journals in OR&MS, including *Management Science*, the *European Journal of Operational Research*, *Decision Sciences*, and *Operations Research*. Observe that the yellow cluster represents business research, especially with several representative journals in marketing (e.g., *Journal of Marketing Research*, *Journal of Marketing*, and *Marketing Science*). The blue cluster focuses on economics research and appears more dispersed, with only four strongest co-citation links connecting to DSS journal and *Management Science*.

For Europe, Fig. 6 presents the co-citation of journals cited by the DSS journal's publications from European authors. The minimum citation threshold is 30, and the 100 most representative links are shown in the network.

For journal papers affiliated with European institutions, the self-citations of DSS journal also lead in their reference lists, as evidenced by the largest node (i.e., DSS journal) significantly connecting to most of the journals in the graph. The *European Journal of Operational Research*, *Management Science*, and *MIS Quarterly* are also influential journals highly cited by DSS papers in Europe. Compared with the results of the co-citation of journals in North America (as shown in Fig. 5), the number of journals that are highly cited by DSS papers from Europe is relatively less. In Fig. 6, there are four evident clusters. Many computer science and engineering journals belong to the green cluster, including DSS journal, *Expert Systems with Applications*, and *Communications of the ACM*. The blue cluster groups the journals in the field of OR&MS, represented by the *European Journal of Operational Research* and *Management Science*.

It is worth noting that the position of the *European Journal of Operational Research* in this graph is more significant than that in Fig. 5, reflecting that the European authors of DSS journal cite more frequently the *European Journal of Operational Research* than the authors from North America. Additionally, the strongest co-citation link in the graph is between DSS journal and the *European Journal of Operational Research*. The red cluster mainly includes journals in management, information science, and business, such as *MIS Quarterly*, *Information Systems Research*, and the *Journal of Management Information Systems*. Notably, many of the journals within the red cluster are very frequently co-cited with DSS journal and *Management Science*. The yellow cluster, including several journals from multiple disciplines (e.g., OR&MS, economics, business,

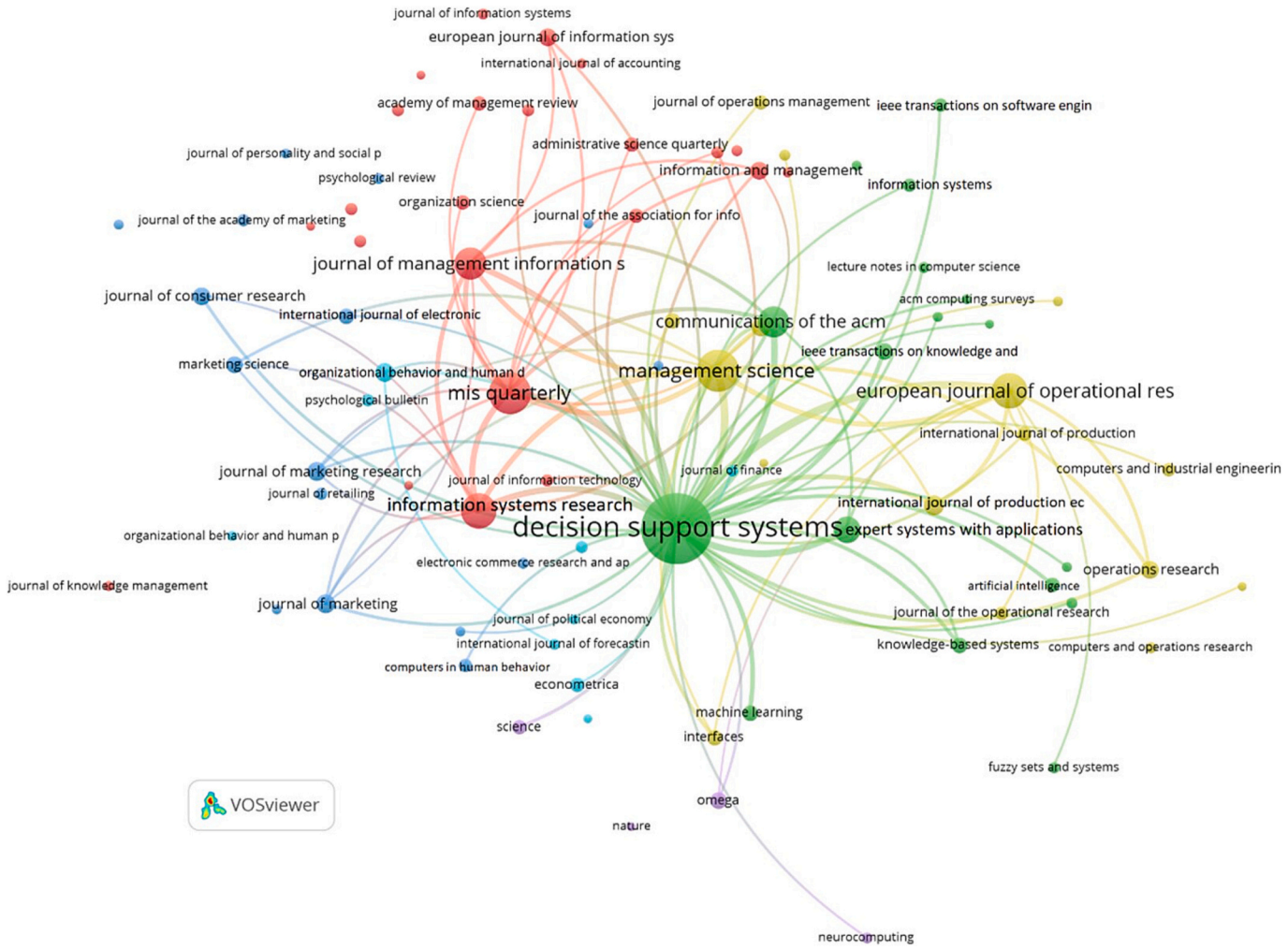

Fig. 8. Co-citation of journals cited in DSS journal: Rest of the World (minimum citation threshold of 20 and 100 links).

and computer science), is loosely interconnected within but has several connections linking to green and blue clusters.

Focusing on the East Asian papers published in DSS journal, Fig. 7 illustrates the co-citation of journals cited considering the minimum threshold of 50 citations and the 100 strongest co-citation links.

Similarly to the results in terms of North America and Europe, the DSS journal itself also dominates in this graph as the most influential journal cited by the DSS papers affiliated with East Asian institutions. Moreover, a majority of the representative co-citation links connect DSS journal to other journals, among which the strongest three are between the DSS journal and *Management Science*, *MIS Quarterly*, and the *European Journal of Operational Research*. Observe that *Management Science*, *MIS Quarterly*, and *Information Systems Research* are also the prominent nodes in the graph that have received a large proportion of citations from the DSS papers by authors working in East Asia.

As illustrated in Fig. 7, the green cluster aggregates many journals closely connected to computer science and engineering, in which DSS journal, *Communications of the ACM*, and *Expert Systems with Applications* are most frequently cited by DSS papers. The red cluster primarily covers journals in the fields of management, information science, and business, including *MIS Quarterly*, *Information Systems Research*, the *Journal of Management Information Systems*, and the *Journal of Marketing Research*. The OR&MS journals are grouped in the blue cluster, such as *Management Science*, the *European Journal of Operational Research*, and the *International Journal of Production Economics*. Note that the red cluster is not only tightly interconnected within but also closely linked to the green and blue clusters. The yellow cluster groups several journals from multiple disciplines that are frequently co-cited by DSS papers, including the *Journal of Business Research*, *Information & Management*, *Computers in Human Behavior*, and *Tourism Management*.

Compared with the North American results, it is noticed that *Expert Systems with Applications* has been cited more frequently by the DSS papers from East Asia, while the importance of *MIS Quarterly*, *Management Science*, and *Communications of the ACM* is relatively reduced. Furthermore, only a few economics journals (e.g., *Econometrica*) are highly cited by the DSS papers from East Asia.

The results of co-citation of journals cited in the DSS journal's publications from the Rest of the World are visualized in Fig. 8. The network considers the minimum citation threshold of 20 and the 100 most representative co-citation links.

The self-citations of DSS journal are also the primary sources in the references of the remaining DSS papers from the Rest of the World, and the DSS journal is strongly co-cited with a majority of the journals shown in the graph. Other influential journals include *MIS Quarterly*, *Management Science*, the *European Journal of Operational Research*, *Information Systems Research*, the *Journal of Management Information Systems*, *Communications of the ACM*, and *Expert Systems with Applications*, which also have the strongest co-citation links to the DSS journal.

Four main clusters can be identified: The green cluster mainly gathers computer science journals, where DSS journal, *Communications of the ACM*, and *Expert Systems with Applications* are included as the key nodes. The red cluster covers the journals especially in the fields of

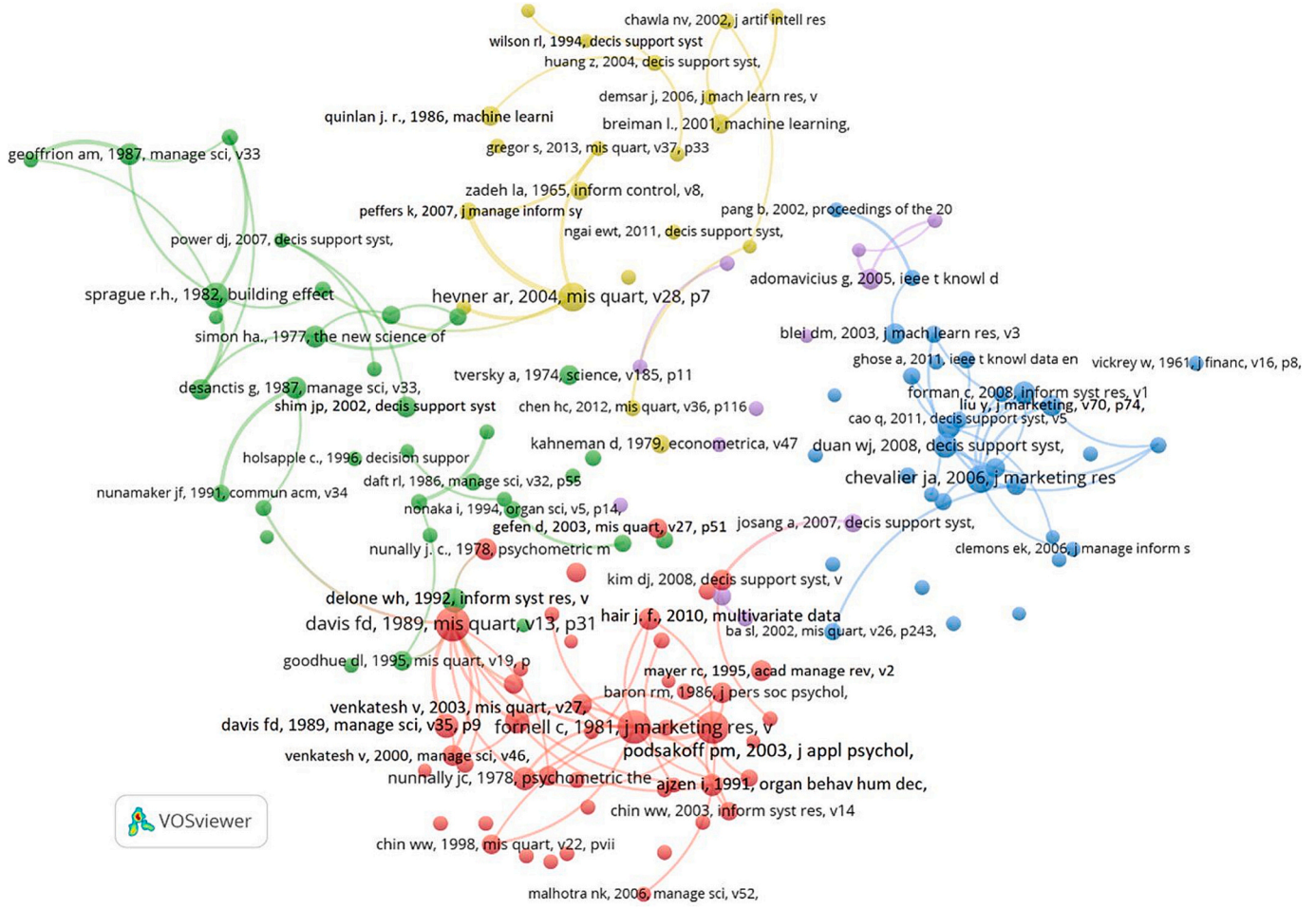

Fig. 9. Co-citation of documents cited in DSS journal: minimum citation threshold of 20 and 100 links.

management and information science, represented by *MIS Quarterly*, *Information Systems Research*, and the *Journal of Management Information Systems*. The OR&MS journals such as *Management Science* and the *European Journal of Operational Research* are grouped into the yellow cluster. The journals involved in the navy-blue cluster are more related to business and marketing research, like the *Journal of Consumer Research*, *Journal of Marketing Research*, and *Journal of Marketing*. Note that the yellow and blue clusters are less connected with each other, but each of them is closely linked to the green and red clusters.

Next, let us analyze the co-citation of documents cited in DSS journal. In this case, the co-cited documents are those that have received citations from the same papers published in DSS journal. Fig. 9 presents the results with a minimum threshold of 20 citations and the 100 most representative co-citation links among the documents. Note that the bibliographic information related to this figure is retrieved from the WoS Core Collection database; that is, the DSS papers published between 1991 and 2023. The size of a node represents the number of citations received by a document from DSS papers, and the width of a link denotes how frequently a pair of documents are co-cited.

The highly cited documents shown in this graph are consistent with the results of Table 5. One of the main advantages of the figure is the visualization of how the most cited documents by the DSS journal's publications are connected with each other via co-citation links. It is interesting to observe that the most cited documents are mostly from DSS journal, *MIS Quarterly*, and *Management Science*. Four evident clusters can be identified in Fig. 9. The red cluster is formed around the top two most cited documents by DSS journal, i.e., the seminal papers of Fred D. Davis published in *MIS Quarterly* in 1989 [134] and Claes Fornell in the *Journal of Marketing Research* in 1981 [135], respectively.

The top two papers both have many strong connections with other co-cited documents within the red cluster. In addition, several highly cited documents connected to psychological research topics are included in the red cluster, such as the paper published in the *Journal of Applied Psychology* by Philip M. Podsakoff in 2003 [136]. The blue cluster is also tightly interconnected within, and the paper by Judith A. Chevalier focusing on examining the effect of word of mouth on sales (published in the Journal of Marketing Research in 2006) [146] is the most cited document by DSS journal in this cluster and strongly connected to several other documents. In the green cluster, most of the documents are classic work published in the eighties and nineties, and the influential book "Building Effective Decision Support Systems" by Ralph H. Sprague and Eric D. Carlson in 1982 [147] is the most cited document by DSS journal within this cluster. For the yellow cluster, Alan R. Hevner's paper published in *MIS Quarterly* in 2004 on design science in information systems research [148] is the most influential document to the DSS journal's publications. Notably, compared to the red and blue clusters, the green and yellow clusters tend to be loosely coupled internally.

We now analyze the co-citation of authors most cited in the journal. The co-citation of authors occurs when two documents of different authors are cited by the same third document. Fig. 10 shows the influential authors who have received at least 100 citations from the DSS journal's publications and the 100 strongest co-citation links among the authors.

The most influential author to DSS journal is Hsinchun Chen, who is also the most productive author in the journal by far (see Table 8). Andrew B. Whinston and Izak Benbasat (from the University of British

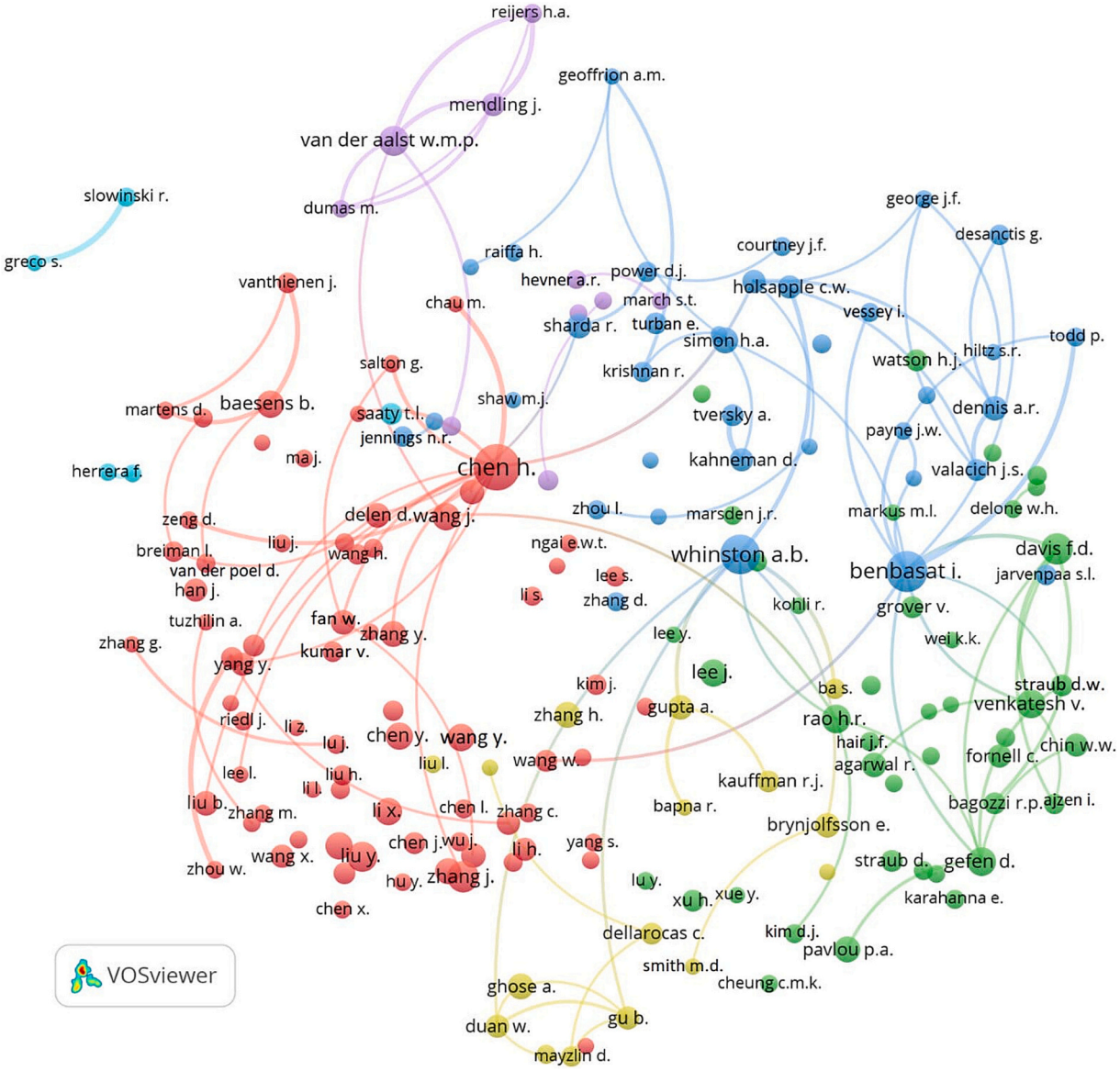

Fig. 10. Co-citation of authors cited in DSS journal: minimum citation threshold of 100 and 100 links.

Columbia, Canada) are also the core authors whose studies have influenced the journal very significantly. Moreover, the three most cited authors have many representative co-citation links with other cited authors. Note that the studies of Hsinchun Chen have been frequently co-cited with those of Michael Chau (from the University of Hong Kong, China) in the journal, and similarly for the studies of Andrew B. Whinston and Clyde W. Holsapple. Furthermore, many of the highly cited authors in this graph are also the authors of the top 50 most cited documents by DSS journal (e.g., Fred D. Davis, Viswanath Venkatesh, and David Gefen in Table 5) or the top 50 leading authors in the journal (e.g., Hsinchun Chen, Dursun Delen, Andrew B. Whinston, and Bart Baesens in Table 8).

3.2. Bibliographic coupling

We now investigate the bibliographic coupling [14] of documents published in DSS journal and of the authors, institutions, and countries/territories publishing in the journal. We first look into the bibliographic coupling of the journal's publications. Bibliographic coupling of documents occurs when two documents cite common documents in their reference lists. Fig. 11 visualizes the results by considering a minimum threshold of 200 citations and the 200 strongest bibliographic coupling links between documents. The size of nodes indicates the total number of citations received for corresponding documents. In addition, the more identical references two documents co-cite, the thicker the link connecting the two documents, and the higher the probability that the two documents contribute to similar research areas. The clustering of the nodes provides insights into the thematic areas in DSS journal which are most interconnected through shared references.

The most representative documents shown in Fig. 11 are consistent with the top 50 most cited documents from Table 4, among which the papers by Jøsang et al. [104], March and Smith [106], Chiu et al. [107], Dan J. Kim et al. [108] and Marston et al. [149], have obtained the largest number of citations. The figure also helps visualize how the highly cited documents in the journal connect with each other through bibliographic coupling links and identify the documents with closer profiles. There are several distinct clusters denoted by different colors, indicating the main specialized research areas that the influential papers of the journal have focused on.

The red cluster is the most prominent one with the largest number of papers interconnected with each other, mainly focusing on research topics related to virtual communities and consumer decisions in

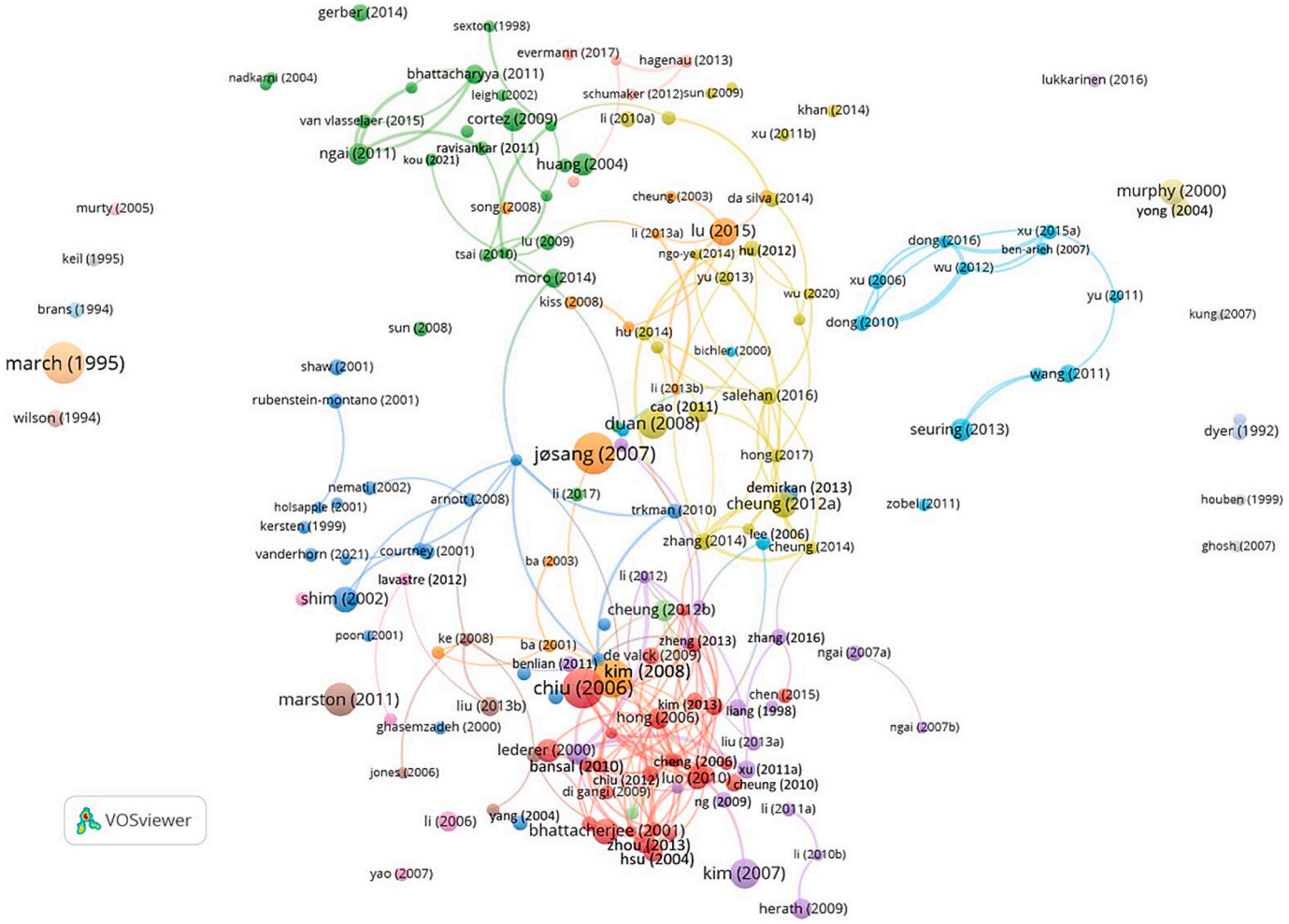

Fig. 11. Bibliographic coupling of documents published in DSS journal: minimum threshold of 200 citations and 200 links.

adopting emerging technologies for online services and electronic commerce. Note that the study of Dan J. Kim et al. [108] (from the orange cluster) is also strongly connected to the red cluster, reflecting that their research areas are closely related. The highly cited papers within the purple cluster pay more attention to the issues of trust and information security in decision making processes, and several of them have strong bibliographic coupling connections with studies from the red cluster.

The yellow cluster is formed around the studies of Duan et al. [131] and Cheung and Thadani [115], highlighting the research topics centered on investigating the influence of online reviews on decision making. The documents in the navy-blue cluster, covering advanced decision support technologies and knowledge management in DSS, tend to be loosely coupled only with five links among the 200 most representative connections in the figure. The light-blue cluster mainly involves documents on topics related to supply chain management and consensus models for decision making.

The green cluster collects some influential papers in terms of using data-driven approaches (e.g., data mining and neural networks) for financial fraud detection and other business settings. Note that Ngai et al. [122] is significantly linked to the other four documents in the green cluster. Several other clusters (e.g., orange, brown, pink, light pink, and light green) are relatively small and loosely connected. It is also observed that a majority of the highly cited documents in each cluster come from the first two decades of the millennium, and they are less strongly connected to other clusters. Furthermore, the papers by Jøsang et al. [104], March and Smith [106] and Marston et al. [149] have no significant bibliographic coupling connections with other papers in the figure, although they are among the top five most cited papers in DSS journal (as shown in Table 4).

We now examine the bibliographic coupling of authors who have published in the journal, i.e. when two authors of different documents cite the same third document. Fig. 12 presents the most productive authors with a minimum publication threshold of five documents in the journal and the 100 most representative bibliographic coupling links between authors. The size of nodes represents the total number of publications for a give author in DSS journal. The thicker the link connecting two authors, the higher the number of the same documents a pair of DSS papers by the two authors co-cite, and the more likely the two authors work in similar research areas. Moreover, the color of a node in Fig. 12 represents the average publication year of all the author's papers published in DSS journal.

The results obtained from the bibliographic coupling analysis of the authors are consistent with those of Tables 8 and 9. It is noticeable that a majority of the most productive authors have published more papers in the journal during the last two decades, including the top four leading authors in the journal: Hsinchun Chen, Indranil Bose, Selwyn Piramuthu, and Dursun Delen. However, Andrew B. Whinston, Michael J. Shaw, and Clyde W. Holsapple (from the University of Kentucky, USA), have published more frequently in the journal before 2005.

Most of the strong bibliographic coupling links have occurred since the average publication year 2010. It is worth noting that the representative links in the graph tend to connect two authors with similar average publication years of their DSS papers, indicating that the

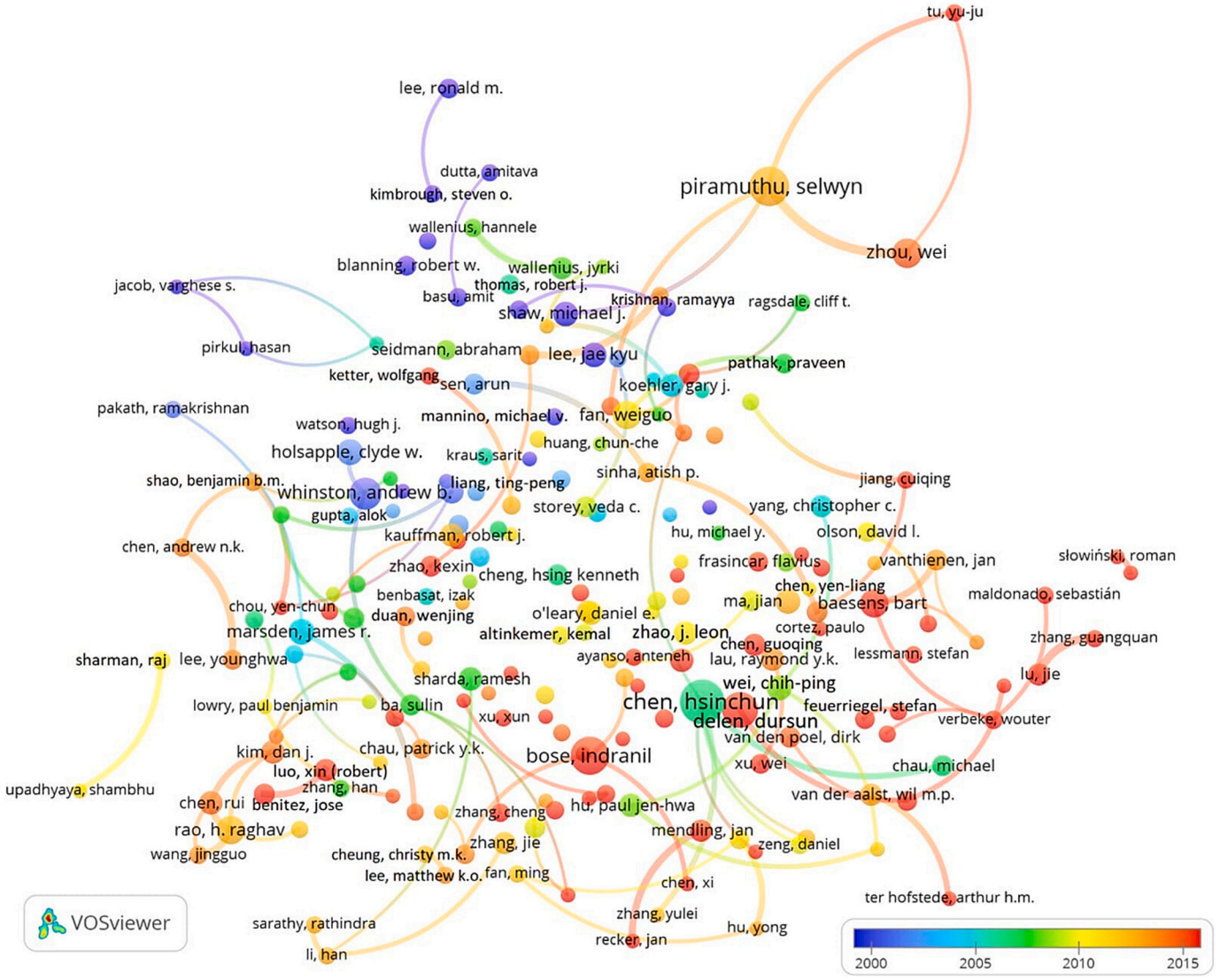

Fig. 12. Bibliographic coupling of authors publishing in DSS journal: minimum publication threshold of 5 documents and 100 links.

authors with similar research profiles have published more frequently in the journal during the same period. For example, there is a significant bibliographic coupling connection between Selwyn Piramuthu and Wei Zhou during the period around 2010–2015, reflecting that the two authors focused more on similar research topics in the journal.

We now analyze the bibliographic coupling of institutions that publish in the journal. This bibliographic coupling occurs when two documents from different institutions cite the same third document. Fig. 13 presents the results with a minimum publication threshold of 10 documents and the 100 strongest bibliographic coupling links between institutions. Note that the bibliographic data used here are retrieved from the WoS Core Collection database in terms of the journal's publications between 1991 and 2023. The more the same documents two DSS papers (by two different institutions) co-cite, the stronger the link strength connecting the two institutions, and the higher the probability that the two institutions conduct similar research. Additionally, the color of a specific institution denotes the average publication year of all its DSS publications.

The leading institutions of the journal shown in this figure are in line with the results of Tables 10 and 11. The City University of Hong Kong, the University of Arizona, and the University of Florida are the most productive institutions in the journal and strongly connect to many other institutions in the graph. Note that most of the leading institutions are from the USA, and they are more frequently connected with each other. Moreover, many institutions from the USA show an important presence in DSS journal before 2010, while most of the European and Asian institutions have become more relevant since 2014, particularly those from China. Additionally, it is worth noting that a majority of the representative connections link the institutions that have a similar average publication year. The finding indicates that these institutions tend to work on closer topics or research areas during the same period.

To summarize the results from the country/territory perspective, Fig. 14 shows the bibliographic coupling of countries/ territories that publish frequently in DSS journal with a minimum publication threshold of five documents and the 50 most representative bibliographic coupling links. Note that the color of a country/territory represents the average publication year of all the DSS publications affiliated with the country/ territory.

The USA is the most productive country in the journal and holds a dominant position being strongly connected to many other countries/ territories, especially China, Taiwan, and Hong Kong. Note that in this figure, the journal's publications from Hong Kong were analyzed independently of those from the mainland of China. The average publication year corresponding to the USA is around 2007. Canada, the Netherlands, and South Korea show their important presence mainly around 2008, and Taiwan, Hong Kong, and the UK mainly around 2010. China

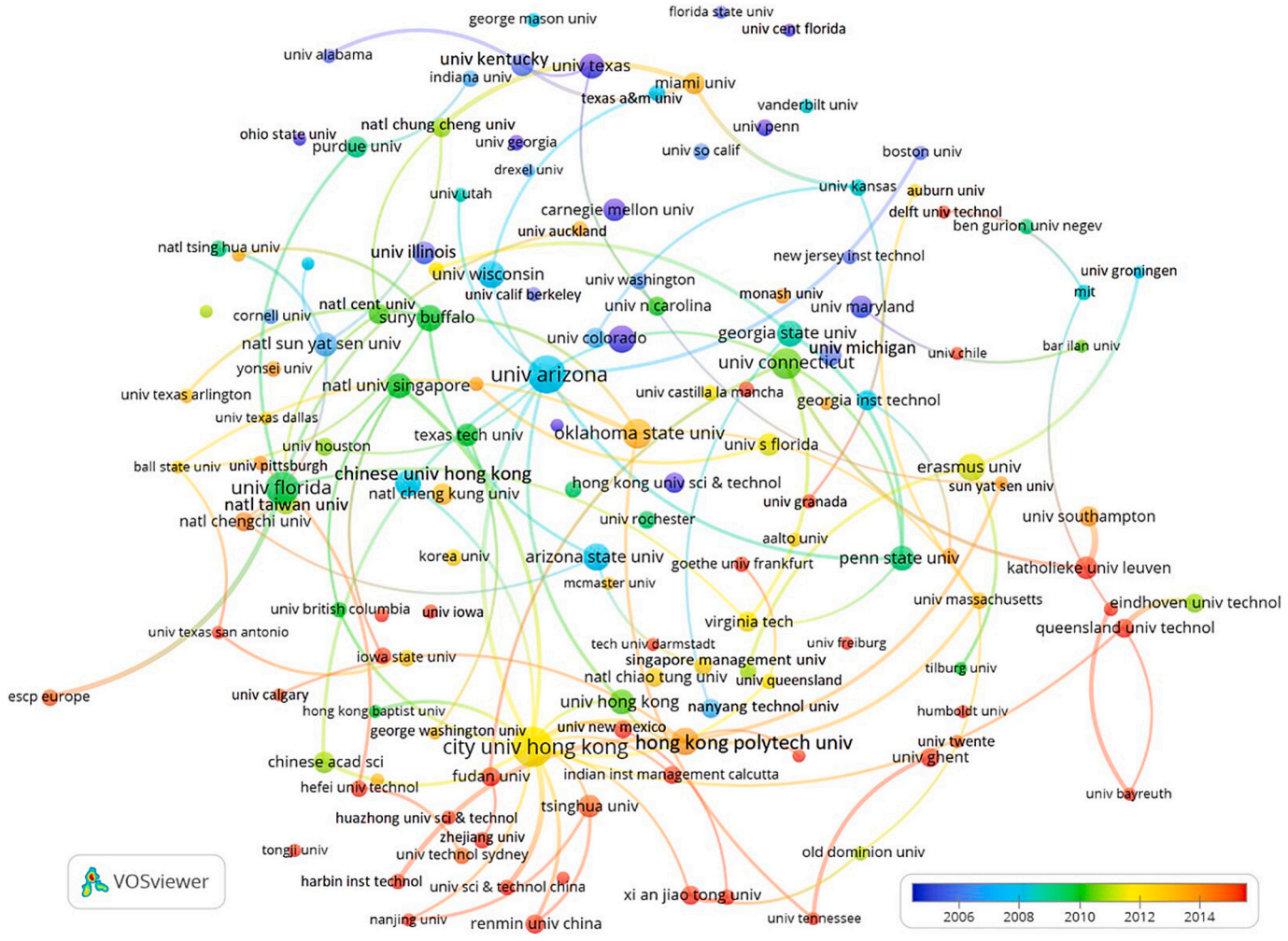

Fig. 13. Bibliographic coupling of institutions publishing in DSS journal: minimum publication threshold of 10 documents and 100 links.

presents a trend of publishing more papers in DSS journal in more recent years. The results in the graph are consistent with those of Tables 12 and 13. It is worth noting that apart from the USA, the major hubs with lots of strong bibliographic coupling links also include China, Hong Kong, Taiwan, Canada, Germany, Australia, France, Spain, the UK, South Korea, the Netherlands, and Singapore.

3.3. Keyword and topical analysis

To identify the thematic trends and patterns of DSS journal, this section analyzes the most popular keywords and topics published in the journal. First, a graphical analysis of the co-occurrence of author keywords is developed using the VOSviewer software. This type of co-occurrence occurs when two author-provided keywords appear together in the same documents [9,10,150]. Fig. 15 visualizes the general map of the co-occurrence network of author keywords in the journal (between 1985 and 2023) considering a minimum occurrence threshold of five times and the 200 most representative co-occurrence links. Note that the size of a node reflects the frequency with which a specific author keyword occurs in the journal's publications, and the color of a node (ranging from blue to red) represents the average year of publication for all the related papers involving the author keyword.

"Decision Support Systems" (unifying with "Decision Support System" and "DSS") is by far the most popular author keyword in the journal and has the most extensive network connecting with a wide array of related keywords in the general map. "Data Mining", "Machine Learning", "Electronic Commerce" (unifying with "E-Commerce"), "Knowledge Management", "Decision Making", and "Text Mining" are also the more common keywords used by authors to characterize their papers. From an overall perspective, the journal mainly focuses on the specialized area of DSS research while contributing to a diverse range of topics with the multidisciplinary profile of computer science, OR&MS, business, marketing, social sciences, or engineering.

By looking into the co-occurrence of author keywords with timeline, we can further examine how the structure and emphasis of research topics have evolved through time. Observe that at the beginning of the millennium, the "Decision Support Systems" term shows its remarkable presence and acts as a main hub strongly connecting "Expert Systems", "Model Management", "Executive Information Systems", and "Information Systems". In this period, some of the popular methods, tools, and techniques used to support decision making include "Artificial Intelligence", "Logic Programming", "Linear Programming", "Structured Modeling", "Logic Modeling", and "Inductive Learning".

For the period between 2005 and 2010, "Decision Support System", "Data Mining", "Knowledge Management", "Electronic Commerce", "Decision Making", and "Neural Networks" became the most frequently used author keywords. Additionally, "Genetic Algorithms", "Classification", "Case-Based Reasoning", and "Decision Trees" also show their high relevance to modeling and analysis techniques in this period. From 2010 to 2015, "Machine Learning", "E-Commerce", "Trust", "Business Intelligence", "Data Quality", "Feature Selection", "Risk Management", and "Decision Analysis" tend to be the more popular author keywords in the journal's publications. In more recent years, "Text Mining", "Sentiment Analysis", "Social Media", "Online Reviews" (unifying with

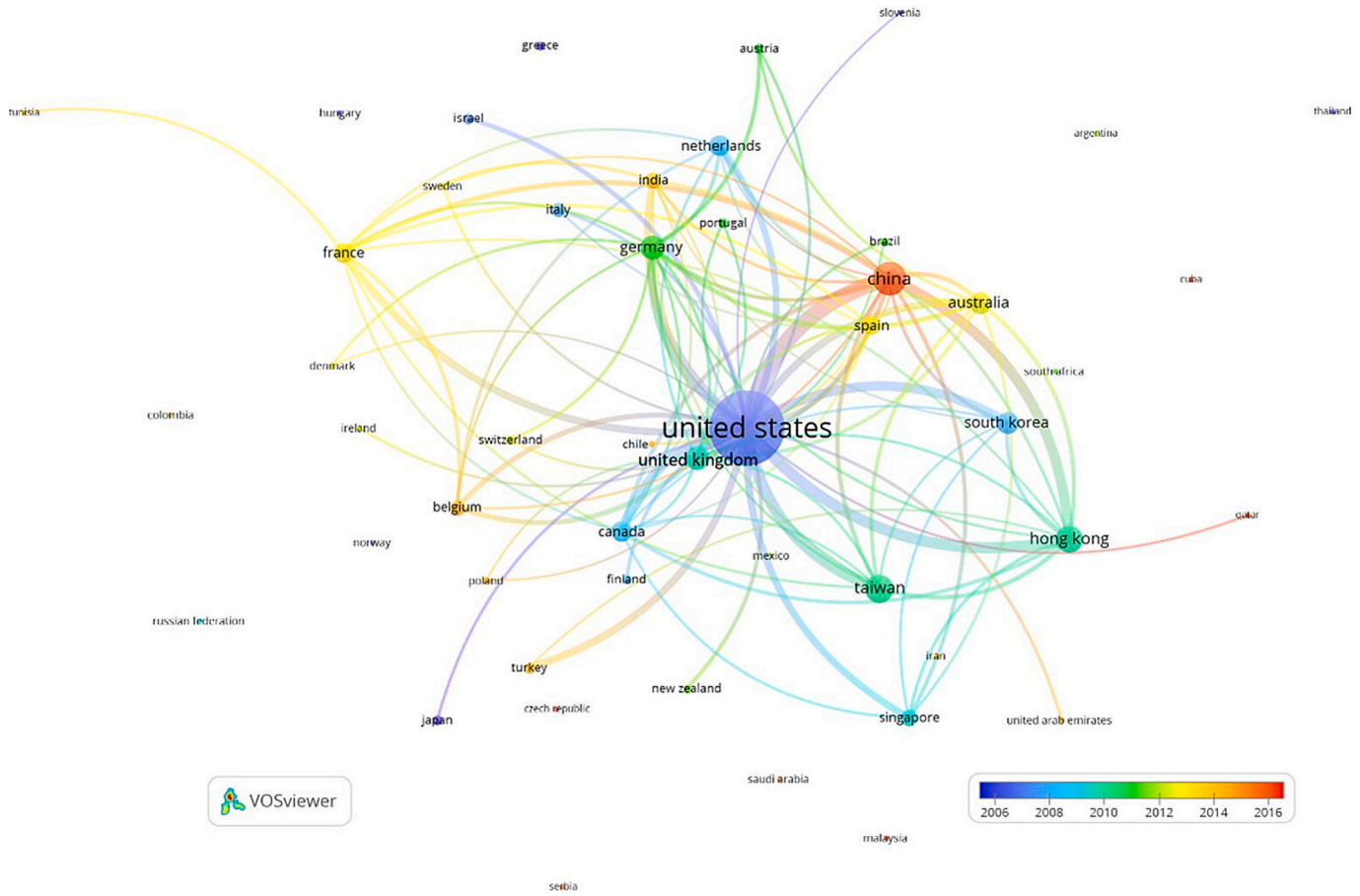

Fig. 14. Bibliographic coupling of countries/territories publishing in DSS journal: minimum publication threshold of five documents and 50 links.

"Online Review"), "Deep Learning", "Recommender Systems", "Collaborative Filtering", and "Process Mining" have become the most frequently used author keywords, revealing the emergent themes the DSS journal is addressing.

Moreover, it is worth noting that "Machine Learning" has many links connecting to the keywords used in more recent journal publications, indicating that the machine learning technology has been extensively applied across several specific domains like text mining and sentiment analysis to support decision making processes. There is a tendency that the decision making techniques utilized in DSS journal have been shifting from model-driven approaches towards data-driven approaches. Another interesting fact is that most of the representative co-occurrence links in the graph connect the author keywords with similar average publication years.

We now develop a geographical classification of the results to further investigate the most popular author keywords and related topics in the journal regarding different regions around the world. Similarly with the geographical analysis of the co-citation of journals cited in DSS journal (as shown in Figs. 5–8), the same four representative regions are considered: North America, Europe, East Asia, and the Rest of the World.

Fig. 16 illustrates the co-occurrence network of author keywords for the documents published in DSS journal by the authors working at North American institutions. The figure considers a minimum occurrence threshold of five times and the 100 strongest co-occurrence links.

"Decision Support Systems" (unifying with "Decision Support System" and "DSS") is the most popular keyword in the journal used by North American authors, followed by "Electronic Commerce" (unifying with "*E*-Commerce"), "Decision Support", and "Data Mining". Note that the "Decision Support Systems" keyword is identified as the largest hub strongly connecting a wide range of commonly used keywords mainly in the nineties (e.g., "Model Management", "Expert Systems", "Artificial Intelligence", and "Group Decision Support Systems", and "Group Support Systems") and around the period 2000–2005 (e.g., "Decision Support", "Knowledge Management", "Simulation", and "Integer Programming").

For the average publication year around 2010, "Data Mining", "Machine Learning", "Classification", "Information Sharing", and "Information Security" have obtained more significant presences in North American publications. Noticeably, the average publication year for "Machine Learning" in North America is earlier than that in the world, indicating that North America is leading in machine learning research and its applications to areas of DSS journal. "E-Commerce" and "Trust" appeared more frequently during the period 2010–2015, and there is a strong connection between them. During the more recent period since 2015, "Social Media", "Text Mining", "Sentiment Analysis", and "Online Reviews" (unifying with "Online Review") have become the more prominent keywords used by North American authors, which is consistent with the worldwide emergent trends in the journal. In addition, "Text Mining" is significantly connected to "Business Intelligence", "Machine Learning", and "Online Reviews", and "Sentiment Analysis" is closely linked to "Social Media" and "Business Intelligence".

Now, let us analyze the results for Europe. Fig. 17 shows the co-occurrence of author keywords for the documents published by European institutions. The figure uses a minimum occurrence threshold of three times and the 100 most representative co-occurrence links between the author keywords.

In Europe, "Decision Support Systems" (unifying with "Decision Support System" and "DSS") takes the leading position among all the keywords used by authors in DSS journal. "Machine Learning", "Decision Support", "Simulation", and "Data Mining" have also become very

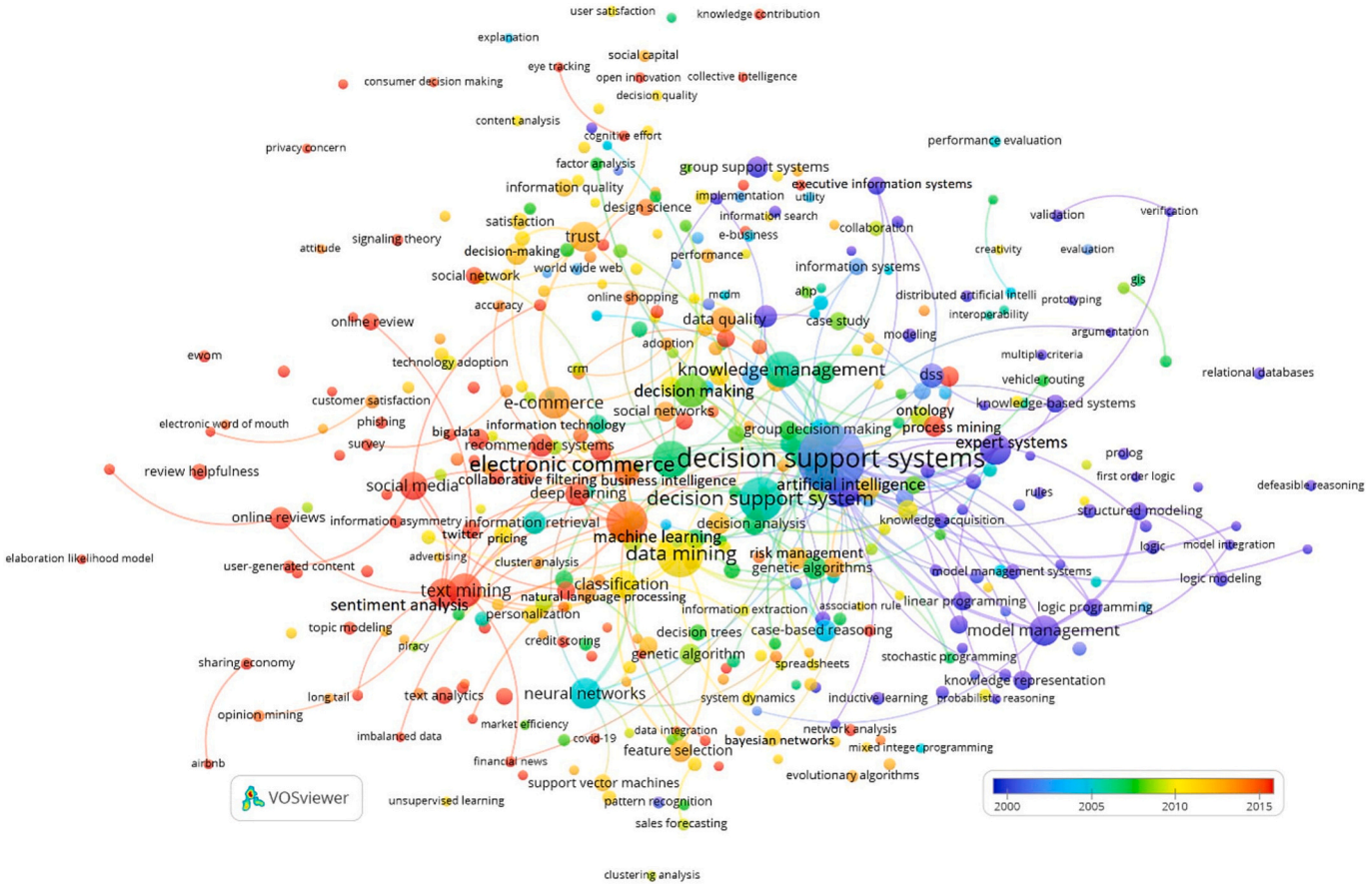

Fig. 15. Co-occurrence of author keywords in DSS journal: minimum occurrence threshold of five and 200 links.

popular among the authors working at European institutions. Note that during the first years of the millennium, the "Decision Support Systems" keyword has occurred more frequently together with "Expert Systems", "Optimization", and "Artificial Intelligence".

For the average publication year between 2005 and 2010, many topics around "Decision Support System", "Decision Support", and "Decision Analysis" have been further consolidated, and several emergent keywords were growing, including "Simulation", "Electronic Commerce", "Trust", and "Multi-Agent Systems". Over the period around 2010–2015, "Data Mining", "Decision Making", "Classification", "Risk Management", and "Supply Chain Management" obtained more attention from European researchers, and then from 2015 to 2020, "Machine Learning" became the most prominent author keyword, followed by "Text Mining", "Sentiment Analysis", "Process Mining", "Business Process Management", "Social Media", and "Natural Language Processing". More recently, "Deep Learning", "Predictive Analytics", and "Analytics" have developed to be the most popular keywords used by European authors in the journal.

Compared with the North American results, although many of the author keywords have also been frequently used in Europe, they tend to come into being in a later period, such as "Artificial Intelligence", "Neural Networks", "Data Mining", "Classification", and "Machine Learning". It is worth noting that "Model Management" and "Electronic Commerce" are not the leading author keywords in this figure, but they have received more attention in North America; on the contrary, "Process Mining", "Business Process Management", "Risk Management", "Deep Learning", "Natural Language Processing", and "Predictive Analytics" have presented their relatively strong relevance to the research conducted by European institutions in DSS journal. Moreover, another significant difference is that in Europe, "Machine Learning" has been used more frequently than "Data Mining", while it is the opposite in North America.

Next, the most popular author keywords used by East Asian institutions are investigated. Fig. 18 presents the co-occurrence network of author keywords in terms of East Asia considering a minimum occurrence threshold of three documents and the 100 most significant co-occurrence links. Note that more than half of the related documents analyzed are published by authors working at Chinese institutions.

"Decision Support Systems" (unifying with "Decision Support System" and "DSS") and "Data Mining" are the most popular author keywords used by East Asian institutions in the journal, followed by "Electronic Commerce" (unifying with "*E*-Commerce"), "Machine Learning", "Knowledge Management", "Text Mining", and "Collaborative Filtering". Note that "Decision Support Systems" is more frequently connected to the keywords with an average publication year around 2005, while "Data Mining" has more co-occurrence links with the keywords around 2010. During the years between 2008 and 2010, apart from "Data Mining" and "Decision Support System", "Electronic Commerce", "Knowledge Management", "Group Decision Making", "Genetic Algorithm", and "Data Envelopment Analysis" have also obtained more attention in East Asia. For the period around 2011–2014, "Machine Learning" has become the most commonly used author keyword, followed by "Trust", "Supply Chain", and "Information Technology". "Text Mining", "E-Commerce", "Collaborative Filtering", "Recommender Systems", "Feature Selection", and "Social Media" were then getting more popular between 2015 and 2018.

Since 2018, the author keywords including "Deep Learning", "Crowdfunding", "Review Helpfulness", and "Text Analytics" have been used more frequently in the documents published by East Asian institutions. Compared with the North American and European results, it is obvious that the network centered on "Decision Support Systems" is formed in a later period in East Asia. However, "Machine Learning",

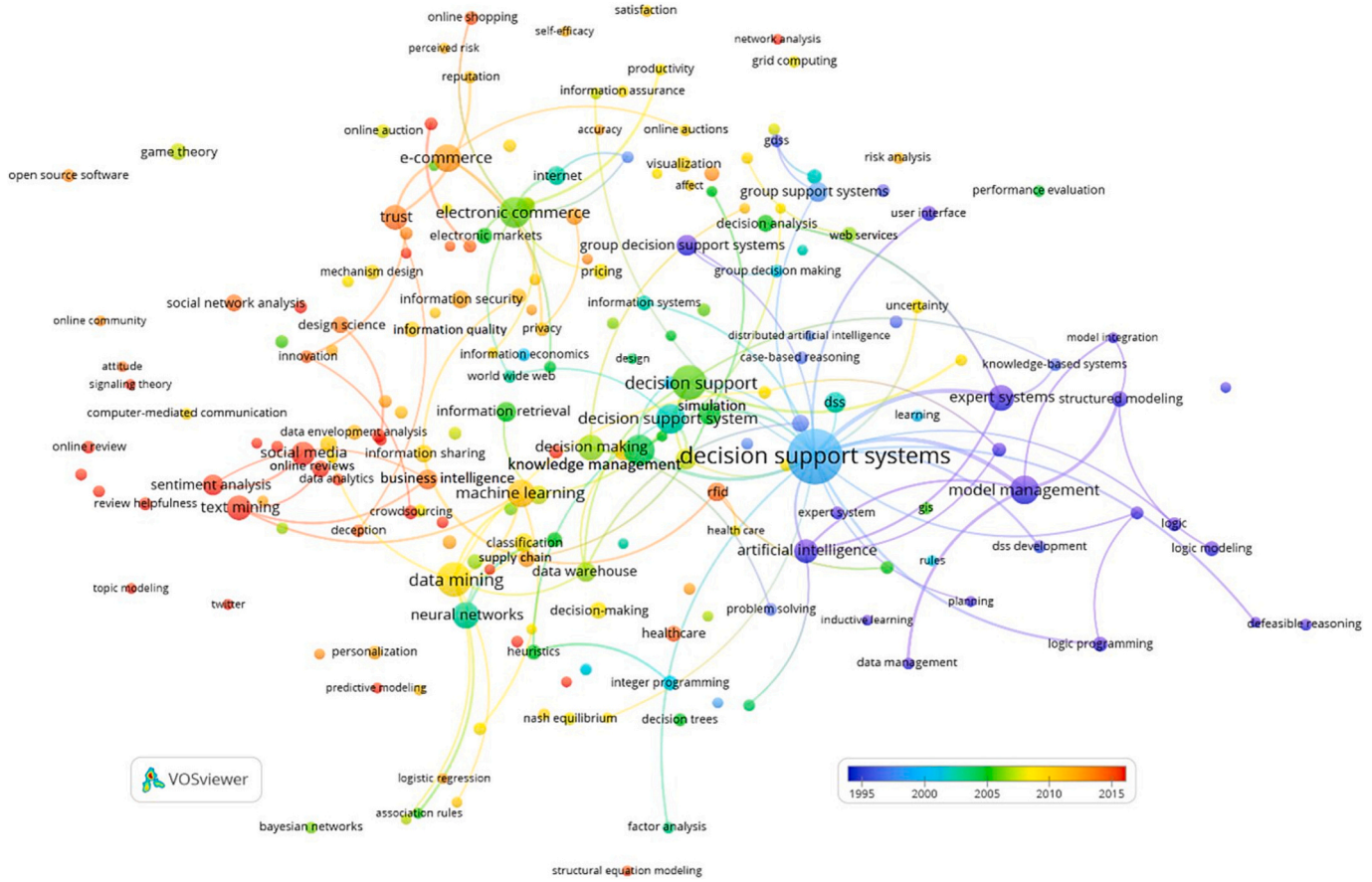

Fig. 16. Co-occurrence of author keywords in DSS journal: North America (minimum occurrence threshold of five and 100 links).

"Supply Chain Management", "Neural Networks", and "Classification" are some of the prominent author keywords which have appeared earlier than those in Europe. In addition, note that "Data Mining" plays a more important role in East Asian publications of the journal, compared to the North American and European publications, while the situation is opposite for the keyword "Simulation". In East Asia, several keywords especially "Knowledge Management", "Collaborative Filtering", "Recommender Systems", and "Crowdfunding" have also received more attention.

Finally, we analyze the results for the Rest of the World. Fig. 19 presents the co-occurrence network of author keywords for the documents published in the journal by the Rest of the World's institutions. The figure considers a minimum occurrence threshold of three times and the 100 most significant co-occurrence links between the author keywords.

For the rest of the regions, the most popular author keyword is "Decision Support Systems" (unifying with "Decision Support System"), and several other keywords including "Decision Support", "Machine Learning", "Decision Making", "Data Mining", and "Electronic Commerce" (unifying with "*E*-Commerce") are also highly ranked. From a general perspective, the number of author keywords in this figure is less than that in Figs. 16–18, resulting in a more dispersed co-occurrence network for the Rest of the World. Note that only a few of the author keywords have occurred frequently in the documents published around 2005, like "Model Management", "Neural Networks", "Group Support Systems", and "Group Decision Support Systems".

Most of the popular author keywords in the figure are from the period about 2010–2015, and there are many co-occurrence links among these keywords, where "Decision Support Systems" and "Decision Support" act as the main hubs connecting to other keywords. Between 2015 and 2020, "Machine Learning" became the most frequent author keyword, followed by "Analytics", "Natural Language Processing", "Sentiment Analysis", and "Online Reviews". More recently, "Deep Learning" and "Text Analytics" have started getting more popular, which is similar to the research tendency in East Asia and Europe.

In general, "Decision Support Systems" (unifying with "Decision Support System" and "DSS") is the most significant author keyword appearing in all the four classified regions (i.e., North America, Europe, East Asia, and the Rest of the World), and some other keywords are also commonly used by authors from all over the world, including "Machine Learning", "Data Mining", and "Electronic Commerce". Additionally, we see that several author keywords are only frequently used by particular regions. For example, "Decision Support" appears more often in North America, Europe, and the Rest of the World but less frequently in East Asia; "Simulation" is commonly used in North America and Europe while less in East Asia and the Rest of the World.

Although the co-occurrence results of author keywords for different regions are influenced by the number of documents published in DSS journal, we can get some general insights into the research trends that have occurred in the journal for the compared regions. Observe that "Decision Support Systems" and "Electronic Commerce" (unifying with "*E*-Commerce") tend to be the long-lasting author keywords for all the regions. Moreover, there is a tendency that data-driven techniques and their applications to decision making problems are attracting more and more attention worldwide, as evidenced by the related more frequently used author keywords in recent years, such as "Machine Learning", "Text Mining", "Deep Learning", and "Natural Language Processing". It is worth noting that North America plays an important role in leading the development of DSS journal's research because many of the common author keywords tend to appear earlier than those in other regions.

To provide specific details of the temporal evolution of the author keywords in DSS journal, Table 15 presents the 40 most popular author

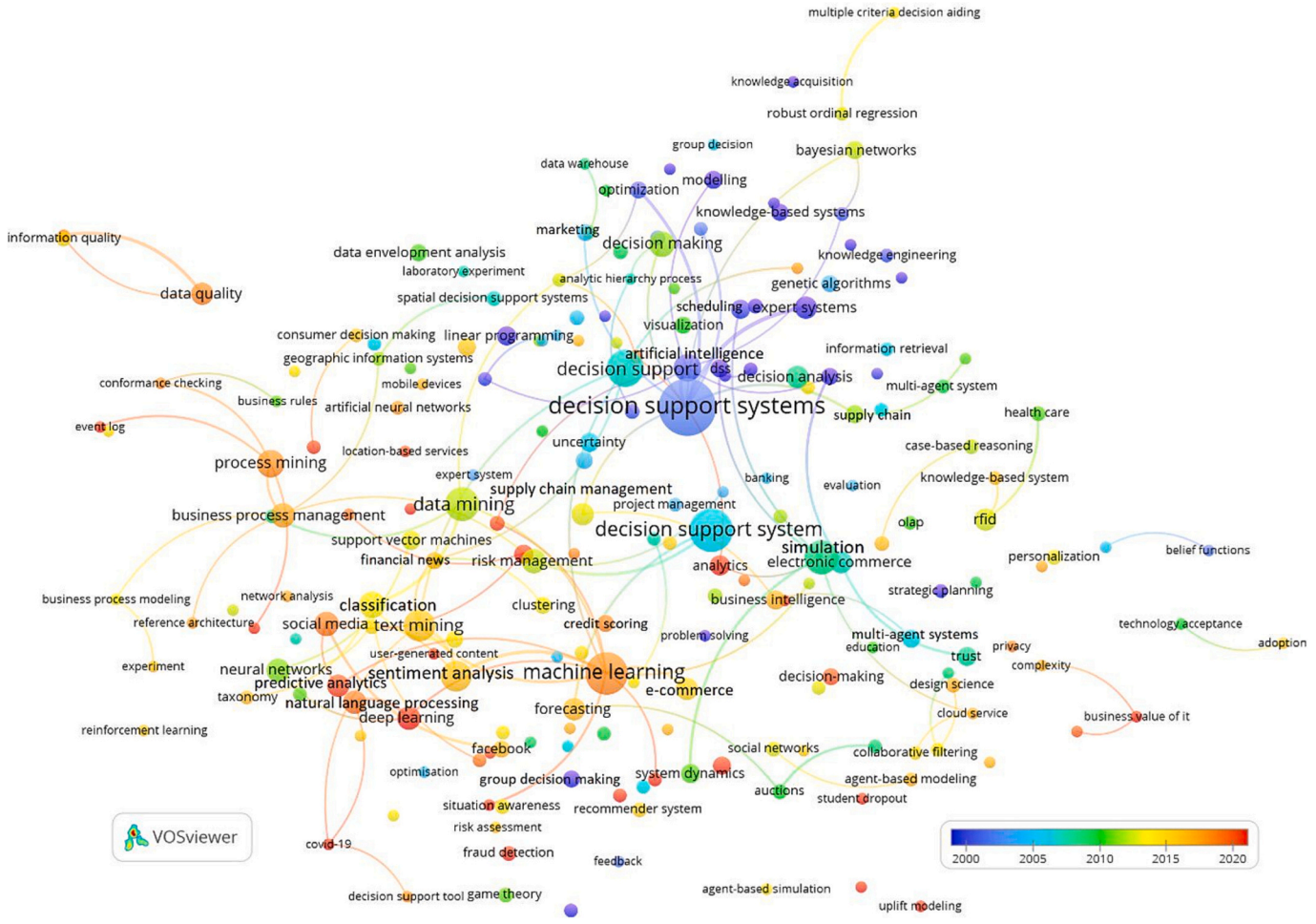

Fig. 17. Co-occurrence of author keywords in DSS journal: Europe (minimum occurrence threshold of three and 100 links).

keywords of the journal from 1985 to 2023 (columns of "Global") and in three periods: 1985–2003, 2004–2013, and 2014–2023. In the table we unify the singular and plural terms and combine some terms with those using abbreviations or hyphens, such as "Decision Support Systems" ("Decision Support System"), "Expert Systems" ("Expert System"), "Electronic Commerce" ("E-Commerce"), "Online Reviews" ("Online Review"), and "Decision Making" ("Decision-Making").

Generally, the results of Table 15 are consistent with those presented in Fig. 15. In addition, more detailed data of the top 40 author keywords in terms of the number of occurrence times in the journal and the co-occurrence link strength are also provided in the table. "Decision Support Systems" is the most popular author keyword used in the journal of all time and has the highest co-occurrence link strength, followed by "Electronic Commerce", "Data Mining", and "Decision Support". Moreover, among the top 10 most popular author keywords in DSS journal, "Decision Support Systems", "Electronic Commerce", and "Decision Support" have persisted for almost 40 years, indicating that these themes are the long-lasting hotspots and mainstreams in the journal.

Note that "Machine Learning" is ranked in the fifth position of all time thanks to its significant increase especially in the last decade, which has outranked "Decision Support Systems" and become the most popular author keyword in the journal between 2014 and 2023. However, although "Knowledge Management", "Expert Systems", and "Neural Networks" are by far ranked within the top 10 most popular author keywords, they are not in the list of the 40 most frequently used author keywords in the journal for the latest period 2014–2023, which means that the three keywords have lost their dominant positions. In the recent decade, "Data Mining" has decreased from the second place in the period 2004–2013 to the seventh position and has already been overtaken by "Electronic Commerce" and "Text Mining". Observe that "Simulation" and "Genetic Algorithms" climbed in the ranking significantly in the period 2004–2013, but currently they are not as so popular as in previous years.

Some emergent author keywords have occurred during each period and currently, "Online Reviews", "Social Media", "Deep Learning", and "Big Data" are attracting more attention. Furthermore, "Recommender Systems", "Sentiment Analysis", and "Text Mining" have seen a significant increase in their importance since 2014. It is important to know that although "Artificial Intelligence" is no longer the very popular author keyword since 2004, more specific concepts and techniques within artificial intelligence have been adopted more frequently as the author keywords, such as "Machine Learning", "Data Mining", "Text Mining", and "Deep Learning", and "Predictive Analytics".

Further, the study analyzes the publication and citation performances with respect to the journal's keywords indexed in Scopus. In this keyword analysis, the number of associated publications, the number of citations, the *h*-index, the ratio of citations per paper, the number of publications that have reached 100 citations, the number of publications that have reached 10 citations, and the number of papers that are among the 50 most cited papers in DSS journal (as shown in Table 4) are used to measure the journal's keywords. Table 16 presents the 40 most productive and influential keywords in the journal. Note that the table ranks all the keywords according to the number of associated publications, and in case of a tie, the total number of citations of the associated publications is considered as well.

"Decision Support Systems" is the most productive and influential

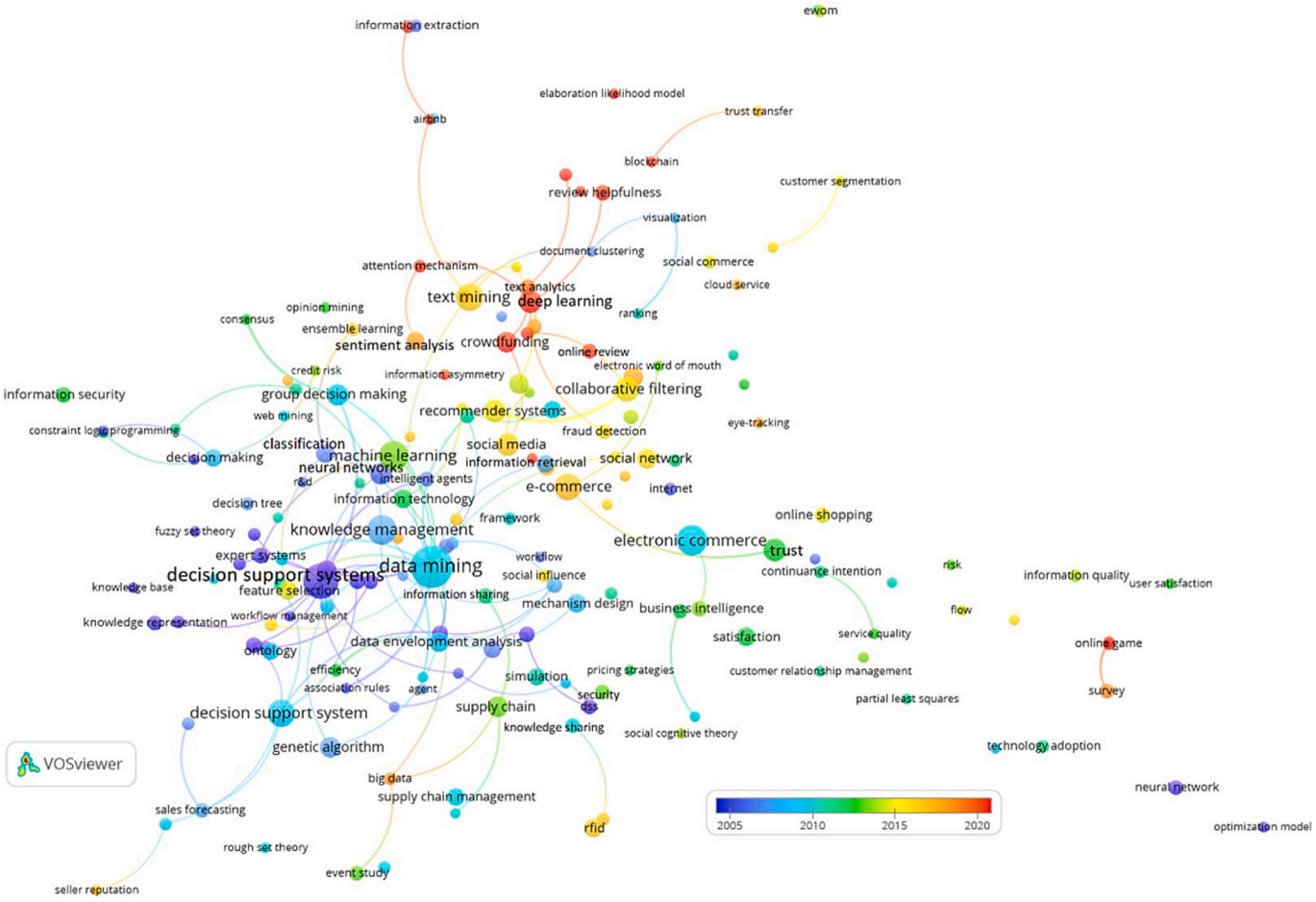

Fig. 18. Co-occurrence of author keywords in DSS journal: East Asia (minimum occurrence threshold of three and 100 links).

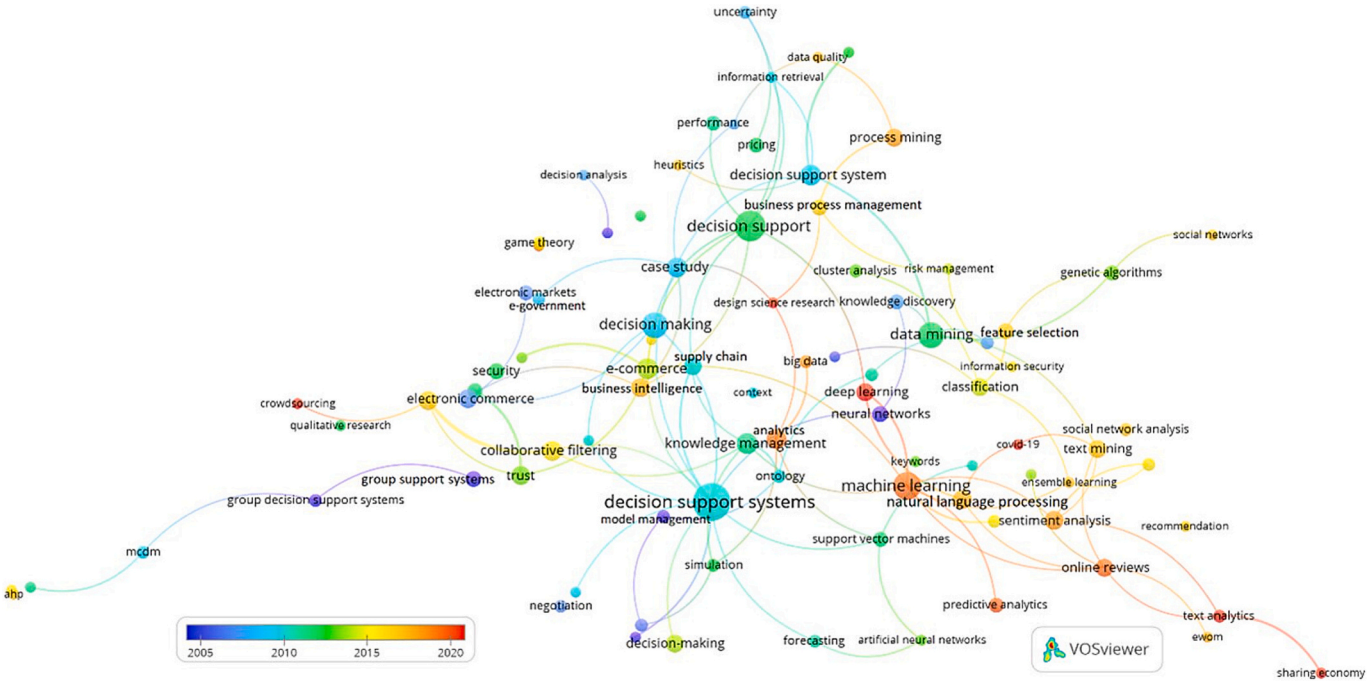

Fig. 19. Co-occurrence of author keywords in DSS journal: Rest of the World (minimum occurrence threshold of three and 100 links).

Table 15
Co-occurrence of author keywords in DSS journal: Global and temporal analysis.

	Global			2014–2023			2004–2013			1985–2003		
R	Author Keyword	Occ	Co-oc	Author Keyword	Occ	Co-oc	Author Keyword	Occ	Co-oc	Author Keyword	Occ	Co-oc
1	Decision Support Systems	350	263	Machine Learning	56	39	Decision Support Systems	123	72	Decision Support Systems	172	134
2	Electronic Commerce	116	89	Decision Support Systems	53	29	Data Mining	62	44	Expert Systems	50	44
3	Data Mining	106	87	Electronic Commerce	35	19	Electronic Commerce	56	39	Model Management	39	37
4	Decision Support	94	73	Online Reviews	34	23	Knowledge Management	40	25	Group Decision Support Systems	34	22
5	Machine Learning	83	71	Text Mining	32	27	Decision Making	36	17	Artificial Intelligence	33	31
6	Decision Making	81	56	Social Media	31	20	Decision Support	35	19	Decision Support	30	26
7	Knowledge Management	64	50	Data Mining	30	23	Neural Networks	29	18	Electronic Commerce	23	17
8	Expert Systems	62	54	Decision Support	29	17	Simulation	27	23	Neural Networks	22	13
9	Neural Networks	60	45	Decision Making	29	16	Genetic Algorithms	26	21	Knowledge Management	21	16
10	Text Mining	55	46	Deep Learning	28	22	Trust	23	17	Knowledge-Based Systems	19	18
11	Simulation	50	44	Sentiment Analysis	27	22	Classification	22	16	Group Support Systems	19	12
12	Genetic Algorithms	47	38	Recommender Systems	25	19	Text Mining	22	14	Logic Programming	16	14
13	Trust	45	37	Big Data	19	17	Data Warehouse	20	16	Decision Making	16	10
14	Artificial Intelligence	43	41	Social Networks	19	7	Supply Chain	19	17	Linear Programming	15	14
15	Model Management	43	39	Trust	18	8	Multi-Agent Systems	19	15	Modeling	15	13
16	Sentiment Analysis	42	32	Data Quality	18	6	Information Retrieval	17	14	Structured Modeling	14	13
17	Classification	38	35	Predictive Analytics	17	10	Optimization	15	13	Data Mining	14	7
18	Recommender Systems	38	32	Process Mining	17	6	Social Networks	15	11	Knowledge Representation	13	13
19	Online Reviews	38	29	Business Intelligence	16	12	Data Envelopment Analysis	15	10	Machine Learning	12	12
20	Social Media	38	28	Crowdsourcing	15	7	Machine Learning	15	9	Simulation	11	10
21	Social Networks	34	23	Analytics	14	11	Supply Chain Management	15	9	User Interface	11	10
22	Group Decision Support Systems	33	21	Text Analytics	14	10	Sentiment Analysis	15	8	Executive Information Systems	11	7
23	Business Intelligence	31	28	Crowdfunding	14	7	Web Services	15	6	Genetic Algorithms	11	7
24	Data Quality	30	19	Review Helpfulness	13	10	Business Intelligence	14	13	Case-Based Reasoning	10	9
25	Optimization	29	25	Twitter	13	10	Online Auctions	14	8	Logic Modeling	10	9
26	Deep Learning	28	23	Collaborative Filtering	13	9	RFID	14	7	Group Decision Making	10	8
27	Information Retrieval	27	22	Social Network Analysis	13	7	Pricing	13	10	Logic	9	9
28	Group Decision Making	27	18	Business Process Management	13	7	Feature Selection	13	8	Problem Solving	9	9
29	Knowledge-Based Systems	25	22	Classification	12	10	Decision Analysis	13	6	Internet	9	8
30	Feature Selection	25	19	Simulation	12	6	Game Theory	13	4	Model Management Systems	9	8
31	Multi-Agent Systems	25	19	Natural Language Processing	11	10	OLAP	12	11	Optimization	9	7
32	Case-Based Reasoning	24	21	Forecasting	11	8	Security	12	9	Data Management	8	8
33	Collaborative Filtering	24	20	Risk Management	11	8	Recommender Systems	12	9	Inductive Learning	8	7
34	Data Warehouse	24	20	Feature Selection	10	7	Information Systems	12	9	Integer Programming	8	7
35	Supply Chain	24	19	Information Asymmetry	9	7	Information Sharing	12	7	Information Retrieval	8	6
36	Forecasting	23	22	Fraud Detection	9	5	Mechanism Design	12	6	Intranet	7	7
37	Risk Management	23	18	Topic Modeling	8	7	Information Security	12	6	Negotiation	7	7
38	Supply Chain Management	23	18	User-Generated Content	8	7	Case-Based Reasoning	11	9	Prolog	7	7
39	Decision Analysis	23	17	Credit Scoring	8	6	Clustering	11	8	Knowledge Acquisition	7	6
40	Social Network Analysis	22	15	Supply Chain Management	7	7	Ontology	11	8	Learning	7	6

Abbreviations: Occ = Occurrences; Co-oc = Co-occurrence link strength.

keyword in the journal with 1362 associated publications and 74,677 citations, distantly followed by "Decision Making" and "Electronic Commerce". "Decision Support Systems" also has the highest value of *h*-index (i.e., 124) and the greatest number of publications reaching 100 citations (173 papers) or 10 citations (1103 papers). In terms of the number of papers among the 50 most cited papers in the journal, "Electronic Commerce" is by far ranked first with 12 highly cited papers, and "Decision Support Systems" and "Decision Making" have 11 papers each. "Online Systems" and "Information Technology" have the highest ratio of citations per paper with around 108, and other influential keywords that have achieved an average of more than 90 citations per paper include "Electronic Commerce", "Internet", "Neural Networks", and "Data Mining".

Note that in the table, many keywords are connected to methods or techniques, including "Artificial Intelligence", "Mathematical Models", "Data Mining", "Decision Theory", "Optimization", "Computer Simulation", "Information Technology", "Algorithms", "Neural Networks", and "Machine Learning", indicating that these methods and techniques have higher relevance to the DSS journal. If we unify the singular and plural terms, the results of "Decision Support Systems" ("Decision Support System") and "Decision Supports" ("Decision Support") would be more significant in the list. Overall, although some of the keywords indexed in

Table 16
The most productive and influential keywords in DSS journal (from Scopus).

R	Keyword	TP	TC	H	C/P	≥100	≥10	T50
1	Decision Support Systems	1362	74,677	124	54.83	173	1103	11
2	Decision Making	768	47,814	104	62.26	113	664	11
3	Electronic Commerce	364	35,017	91	96.20	83	309	12
4	Artificial Intelligence	359	18,423	70	51.32	39	292	4
5	Mathematical Models	297	17,399	73	58.58	44	246	3
6	Data Mining	261	23,895	85	91.55	74	246	8
7	Sales	255	17,016	67	66.73	43	218	3
8	Decision Theory	228	15,556	67	68.23	39	195	3
9	Commerce	195	11,213	51	57.50	24	157	2
10	Information Systems	192	10,774	58	56.11	31	166	0
11	Optimization	191	9609	44	50.31	16	140	2
12	Forecasting	187	13,870	64	74.17	46	168	4
13	Computer Simulation	181	7705	43	42.57	15	141	1
14	Marketing	179	15,101	57	84.36	33	147	7
15	Information Technology	174	18,839	64	108.27	45	161	6
16	Costs	174	8068	47	46.37	19	143	2
17	Social Networking (online)	165	13,199	58	79.99	35	154	5
18	Problem Solving	163	8902	47	54.61	19	128	3
19	Learning Systems	162	9812	56	60.57	27	140	0
20	Algorithms	155	7276	46	46.94	21	118	0
21	Knowledge-Based Systems	149	8295	44	55.67	28	113	1
22	Internet	141	13,308	54	94.38	27	129	5
23	Neural Networks	141	13,000	64	92.20	41	130	4
24	Online Systems	129	13,967	57	108.27	34	118	5
25	World Wide Web	116	8509	44	73.35	21	107	3
26	Competition	114	4668	37	40.95	9	93	0
27	Expert Systems	113	4894	34	43.31	11	66	1
28	Information Management	112	7428	44	66.32	15	93	2
29	Knowledge Management	110	8740	52	79.45	28	107	1
30	Information Retrieval	106	5224	40	49.28	16	84	0
31	Data Structures	104	8485	39	81.59	16	89	2
32	Machine Learning	99	5447	44	55.02	14	86	0
33	Customer Satisfaction	96	8330	51	86.77	26	90	2
34	Behavioral Research	96	7004	38	72.96	16	81	3
35	Computer Software	96	5328	35	55.50	6	76	2
36	Decision Support System	95	3663	34	38.56	7	77	0
37	Decision Supports	94	5663	43	60.24	13	83	0
38	Investments	94	5362	42	57.04	12	81	0
39	Decision Support	94	5305	39	56.44	14	81	1
40	Societies and Institutions	93	6030	41	64.84	19	87	1

Abbreviations: R = Rank; TP and TC = Total papers and citations; H = *h*-index; C/P = Citations per paper; ≥100, ≥10 = Number of papers with equal or more than 100 and 10 citations; T50 = Number of papers in Table 4.

Scopus may not exactly the same as the author keywords used in the journal's publications, the ranking results in Table 16 are basically coincide with those shown in Fig. 15 and Table 15.

To provide a more general picture of the keyword analysis results, this work summarizes the leading topics and topic clusters in DSS journal using the SciVal platform. As a sub-database of Scopus, SciVal [145] uses Scopus data (from 1996 to the present) to analyze related bibliographic information and generate high-level overviews of the research performance of authors, research institutions, countries/territories, and journals in specific research areas. In the current topical analysis of DSS journal, the 10-year period from 2014 to 2023 is considered. Note that each publication can only belong to one topic and one topic cluster. Three bibliometric indicators are employed for measuring the topics and topic clusters that have contributed to the journal, including the total number of publications, the field-weighted citation impact (FWCI) [151], and the worldwide prominence percentile [152] (in 2023).

To be specific, the total number of publications is used to quantify how much relevance a specific topic (or topic cluster) has in the journal. The FWCI in terms of a topic (or topic cluster) evaluates how the number of citations received by corresponding DSS journal's publications compares with the world average (i.e., the average number of publications received by all other similar publications in the Scopus database), where a value of more than 1.00 indicates the journal's publications on this topic (or topic cluster) have been cited above the global average for similar publications during the period 2014–2023, while a value of less than 1.00 indicates below the global average. The prominence percentile of a topic (or topic cluster) in a specific year, calculated by combining citation count, Scopus views count, and average CiteScore, represents the worldwide impact of the topic (or topic cluster) in this year compared to similar topics (or topic clusters) in all the journals indexed in Scopus [152]. It is important to note that prominence is not a quality indicator but gives an indication of the momentum of a topic (or topic cluster).

Table 17 lists the most frequent topics published in DSS journal between 2014 and 2023. The ranking of the topics is based on the total number of publications, and in case of a tie, the worldwide prominence percentile in 2023 is considered.

The "Online Reviews; Influencer; Social Media" topic leads the journal with 81 publications, distantly followed by "Crowdfunding; Social Network; Finance" (21 publications) and "Recommender Systems; Collaborative Filtering; E-Commerce" (18 publications). The "Neural Network; Artificial Intelligence; Machine Learning" topic has the highest prominence percentile with 99.91 in 2023, signifying its strong momentum in the field. In terms of the FWCI, the "Fraud Detection; Credit Card; Machine Learning" topic obtains the highest value of 8.05, underscoring its significant influence and widespread recognition compared to the global average in the field. Observe that a great number of the topics listed in the table have been cited well above the global average with relatively high results in the FWCI (more than 2.00), and most of them are also included in the top 10 % of worldwide topics by prominence. Moreover, many of the leading topics connect to

Table 17
Leading topics in DSS journal between 2014 and 2023.

R	Topic	TP	FWCI	PP
1	Online Reviews; Influencer; Social Media	81	3.40	99.87
2	Crowdfunding; Social Network; Finance	21	2.26	99.23
3	Recommender Systems; Collaborative Filtering; *E*-Commerce	18	4.21	98.53
4	Big Data; Decision-Making; Data Analytics	15	3.97	99.74
5	Social Networking (Online); Sentiment Classification; Data Mining	15	5.17	99.32
6	Process Mining; Business Process; Information System	15	2.77	98.38
7	Insolvency; Financial Ratio; Bankruptcy	14	3.74	97.87
8	Privacy Concern; Personal Information; Social Media	13	2.96	99.08
9	Data Reduction; Information Quality; Internet of Things	12	1.17	89.66
10	Market Forecasting; Neural Network; Commerce	11	3.41	99.66
11	Open Innovation; Consumers; Social Media	11	1.76	95.99
12	Consumer Behavior; Customer Experience; E-Commerce	10	5.07	99.43
13	Credit Rating; Support Vector Machine; Machine Learning	10	3.43	98.18
14	Decision Trees; Support Vector Machine; Machine Learning	10	3.59	97.51
15	Multi Agent Systems; Decision-Making; Intelligent Agent	10	1.75	78.16
16	Network Economics; Business Models; Commerce	9	1.03	93.46
17	Sharing Economy; Airbnb; Commerce	8	4.17	99.67
18	Security Systems; Information Security Policy; Cybersecurity	8	2.34	98.95
19	Security Investment; Decision-Making; Cybersecurity	8	2.00	92.57
20	Social Network; Influencer; Commerce	8	2.41	91.24
21	Fraud Detection; Credit Card; Machine Learning	7	8.05	98.43
22	Crowdsourcing; Learning Systems; Artificial Intelligence	7	2.78	95.31
23	Electronic Mail; Phishing Attack; Cybersecurity	7	1.71	94.00
24	Process Monitoring; Business Process; Data Mining	7	4.35	92.31
25	Search Engine; Internet Marketing; Auction	7	0.87	89.58
26	Aspect-Based Sentiment Analysis; Feature Extraction; Data Mining	7	2.72	88.00
27	Learning Curve; Production System; Knowledge Management	7	2.10	84.98
28	Neural Network; Artificial Intelligence; Machine Learning	6	3.81	99.91
29	Shopping Online; Influencer; E-Commerce	6	2.91	96.87
30	Business Value; Firm Performance; Information Technology	6	1.29	96.51
31	Decision Making; Multicriteria; Multiple-Criteria Decision Analysis	6	1.57	95.42
32	Spam; Support Vector Machine; Machine Learning	6	7.06	94.85
33	Recommender Systems; Collaborative Filtering; Artificial Intelligence	6	2.18	94.05
34	Decision-Making; Information Analysis; Business Intelligence	6	1.81	67.55
–	18 Topics	5	–	–
–	21 Topics	4	–	–
–	35 Topics	3	–	–
–	73 Topics	2	–	–
–	364 Topics	1	–	–

Abbreviations: R = Rank; TP = Total papers; FWCI = Field-weighted citation impact (data from Scopus); PP = Worldwide prominence percentile in 2023.

decision making, commerce, electronic commerce, social media, and cybersecurity. Particularly, popular research methods and techniques that frequently appear in the leading topics mainly include machine learning, data mining, support vector machine, artificial intelligence, collaborative filtering, and neural network.

Subsequently, let us analyze the leading topic clusters within DSS journal between 2014 and 2023. Table 18 summarizes the results available in the SciVal platform considering the same ranking rule as Table 17.

"Sentiment Analysis; Natural Language Processing; Machine Learning" is the most popular topic cluster in the journal, with 147 papers published in the period 2014–2023. This topic cluster also has a remarkable FWCI of 3.43 and a high prominence percentile of 99.67, indicating its significant impact and strong momentum in the field. "Social Media; Adoption; E-Commerce" and "Data Mining; Artificial Intelligence; E-Commerce" are also the top-ranked topic clusters, connected to 59 and 55 publications of the journal, respectively. Note that "Machine Learning; Data Mining; Artificial Intelligence" and "Social Media; Adoption; E-Commerce" are identified as the top two topic clusters having the highest FWCI of more than 3.70, meaning that the related research in DSS journal is particularly influential compared to other similar publications indexed in the Scopus database. The "Image Segmentation; Deep Neural Network; Object Detection" topic cluster has the highest prominence percentile (i.e., 100 in 2023), indicating that it has the strongest momentum in the scientific community compared to other topic clusters related to DSS journal.

Furthermore, among the top 31 topic clusters each has at least 10 related publications (between 2014 and 2023) in the journal, 16 of the topic clusters have been cited well over the world average with the FWCI above 2.00, and 13 are in the top 10 % of worldwide topic clusters by prominence. Additionally, it is worth noting that the leading topic clusters in the journal are more frequently connected to data mining, artificial intelligence, machine learning, information systems, commerce, and Internet of Things. The results also reveal that many emerging technologies and their applications in a variety of decision making problems have been embraced in DSS journal, as evidenced by the topic clusters such as "Sentiment Analysis; Natural Language Processing; Machine Learning", "Data Mining; Artificial Intelligence; E-Commerce", "Machine Learning; Data Mining; Artificial Intelligence", "Commerce; Machine Learning; Transport", "Data Mining; Graph Neural Network; Social Network Analysis", and "Image Segmentation; Deep Neural Network; Object Detection".

4. Conclusions

In 2025, *Decision Support Systems* (DSS) celebrates its 40th anniversary. This is a special event marking the culmination of the long academic journey of this top-tier journal. This study presents a bibliometric analysis of the journal during the period from 1985 to 2023, aiming to identify rising and waning trends and landmark results occurring during this long period. To also provide the readers of DSS journal with a complete picture of the current results the journal is achieving, a wide range of issues have been investigated using diverse bibliometric indicators, including the publication and citation structure, the most cited

Table 18
Leading topic clusters in DSS journal between 2014 and 2023.

R	Topic Cluster	TP	FWCI	PP
1	Sentiment Analysis; Natural Language Processing; Machine Learning	147	3.43	99.67
2	Social Media; Adoption; *E*-Commerce	59	3.76	98.95
3	Data Mining; Artificial Intelligence; *E*-Commerce	55	2.87	85.41
4	Web Service; Quality of Service; Data Mining	44	2.76	48.20
5	Corporate Governance; Ownership; Investors	43	2.95	97.58
6	Industry; Information Technology; Business Model	41	1.43	97.44
7	Machine Learning; Data Mining; Artificial Intelligence	41	3.79	93.39
8	Network Security; Cybersecurity; Machine Learning	35	2.18	90.19
9	Commerce; Machine Learning; Transport	30	2.69	90.71
10	Supply Chain Management; Pricing; Commerce	29	1.72	94.37
11	Entrepreneurship; Family Business; Entrepreneurial Orientation	23	2.31	96.46
12	Data Mining; Artificial Intelligence; Information System	23	3.31	79.13
13	Supply Chain Management; Industry; Airline	20	1.50	98.30
14	Data Mining; Graph Neural Network; Social Network Analysis	20	1.14	95.16
15	Integer Programming; Transport; Benchmarking	19	1.41	94.31
16	Data Mining; Artificial Intelligence; Machine Learning	17	1.71	57.55
17	Volunteering; Altruism; Pricing	16	1.62	43.36
18	Commerce; Pricing; Industry	13	1.11	48.65
19	Social Media; Information System; Internet of Things	13	2.96	41.72
20	Internet of Things; Ultra-Wideband; Mobile Computing	12	1.21	80.70
21	Electronic Health Record; Health Care; Medical Informatics	12	2.19	60.62
22	Ontology; Semantic Web; Linked Data	12	1.77	49.24
23	Ubiquitous Computing; Internet of Things; Information System	12	1.17	5.69
24	Image Segmentation; Deep Neural Network; Object Detection	11	3.60	100
25	Blockchain; Smart Contract; Authentication	11	3.28	99.21
26	Multiple-Criteria Decision Analysis; Analytical Hierarchy Process; Artificial Intelligence	10	3.31	84.95
27	Public-Private Partnership; Construction Industry; Project Scheduling	10	1.68	81.36
28	Forestry; Artificial Intelligence; Internet of Things	10	2.73	60.23
29	Decision Making; Behavioral Economics; Prospect Theory	10	0.75	57.35
30	Auction; Cooperative Game; Commerce	10	0.60	35.12
31	Data Visualization; Visual Analytics; Information System	10	1.60	28.90
–	3 Topic Clusters	9	–	–
–	3 Topic Clusters	8	–	–
–	7 Topic Clusters	7	–	–
–	7 Topic Clusters	6	–	–
–	5 Topic Clusters	5	–	–
–	11 Topic Clusters	4	–	–
–	11 Topic Clusters	3	–	–
–	26 Topic Clusters	2	–	–
–	73 Topic Clusters	1	–	–

Abbreviations: R = Rank; TP = Total papers; FWCI = Field-weighted citation impact (data from Scopus); PP = Worldwide prominence percentile in 2023.

papers, the most cited documents by the journal's publications, the citing articles, the leading authors, institutions, countries/territories, and supranational regions, and the most popular topics and their clusters.

The study mainly uses the Scopus database to analyze the journal's bibliographic data, and for some cases, the WoS Core Collection database is also used to supplement the analysis. The journal has grown significantly over time in both the number of publications and the impact on the scientific community. Particularly since 2004, the journal has contributed profoundly to the development of DSS research. The journal is characterized by a multidisciplinary profile and has performed very well compared to other high-impact journals in the fields of OR&MS, computer science, business, economics, management, engineering, information science, or psychology.

Most of the highly cited papers of DSS journal were published during the period 2004–2013, among which 36 (around 1 % of all the journal's publications) have received more than 500 citations. The top 50 most cited papers have all obtained more than 400 citations. Only 19 papers in the journal have not been cited yet in Scopus (less than 1 %). The research topics of those highly cited papers cover a wide range of theoretical and technical advancements (e.g., data mining, modeling, text mining, big data analytics, neural networks, and cloud computing) applied to various decision making problems in electronic commerce, marketing, supply chain management, fraud detection, online services, or information security. DSS journal is frequently cited by itself, *Expert Systems with Applications*, *Sustainability*, *IEEE Access*, and the *European Journal of Operational Research*.

Hsinchun Chen is by far the most productive author in DSS journal, followed by Indranil Bose and Selwyn Piramuthu. The most cited author in the journal is H. Raghav Rao. Dursun Delen has also performed well as the most productive author during the recent decade 2014–2023. Over half of the top 50 leading authors are from the USA and eight are from China. Some of the most productive authors also have papers among the top 50 most cited in the journal, including Dan J. Kim, H. Raghav Rao, Xin (Robert) Luo, Eric W.T. Ngai, and Ramesh Sharda. In addition, 11 authors among the top 50 leading authors cite DSS journal more frequently in their own research. Many current and previous members of DSS's Editorial Board also made significant contributions to the research in the journal.

At the institutional level, the City University of Hong Kong is the most productive and influential institution in the journal. The University of Arizona and the University of Florida are also very productive. The University of Arizona has the most representative presence throughout the lifetime of the journal. Most of the leading universities in the journal are among the top 500 world universities. During the first years of DSS journal, institutions from the USA led the ranking, but over time, performance of institutions from other countries/territories have also become more prominent in the journal, especially the institutions of China. Moreover, the Hong Kong Polytechnic University, City University of Hong Kong, and the Chinese Academy of Sciences are the top three institutions that have cited the journal most frequently.

Looking into the publication and citation structure of DSS journal at the country/territory level, the USA is the most productive and influential country/territory in the journal, ahead of China, Taiwan, the UK,

and Germany. In terms of the "publications per million inhabitants" and "citations per million inhabitants" categories, Singapore and Taiwan are the top two. European and Asian countries/territories perform very well in the journal, contributing to a large proportion of the top 20. In the last few years, the gap between the USA and China in annual number of publications in the journal has narrowed. In 2023, the productivity of China has overtaken that of the USA, indicating that China is playing a more prominent role in the DSS journal's research. However, recently, several developed countries/territories have shown a downward trend in their productivity, including the USA, Taiwan, South Korea, Spain, and Singapore. China and the USA continue to be the top two countries of citing articles to the journal. From the perspective of supranational regions, North America is currently the most productive and influential region, followed by Asia and Europe. Oceania performs the best when normalizing the results per capita. The results further demonstrate the journal's strong impact and diversity of regional distribution with publications from all over the world.

For a deeper analysis, this work develops a graphical mapping of the bibliographic data using the VOSviewer software. The analysis uses co-citation, bibliographic coupling, and co-occurrence of author keywords to visualize the most productive and popular actors of DSS journal and see how they connect with each other. The graphical maps are consistent with the results provided in the tables in terms of journals, documents, authors, institutions, and countries/territories. Particularly, the self-citations of DSS journal present a significant relevance, which is very common for most of the journals. Additionally, *MIS Quarterly*, *Management Science*, *Information Systems Research*, *Communications of the ACM*, the *European Journal of Operational Research*, and the *Journal of Management Information Systems* are also well cited in DSS journal. Notably, European authors in the journal cite more frequently the *European Journal of Operational Research* than the authors from North America. Furthermore, DSS papers from East Asia also significantly cite *Expert Systems with Applications*, while only a few economics journals have been cited. Another finding is that the representative bibliographic coupling links tend to connect two authors with similar average publication years of their DSS papers, which indicates that the authors with similar research profiles have published more frequently in DSS journal during the same period.

In terms of the keyword and topical analysis, "Decision Support Systems" is by far the most popular author keyword, followed by "Electronic Commerce", "Data Mining" and "Decision Support". Recently, "Machine Learning" has outranked "Decision Support Systems". In addition, "Online Reviews", "Social Media", "Deep Learning" and "Big Data" are currently attracting more attention, while "Knowledge Management", "Expert Systems" and "Neural Networks", have lost their dominant positions. Many of the keywords tend to appear earlier in North America compared to other regions (e.g., Europe and East Asia), signifying that North America plays an important role in leading the development of the journal's research. By using the SciVal platform in Scopus, the leading topics and topic clusters in DSS journal between 2014 and 2023 are analyzed. The "Online Reviews; Influencer; Social Media" topic and the "Sentiment Analysis; Natural Language Processing; Machine Learning" topic cluster lead in the journal. In addition, many of the leading topics and topic clusters have been cited well above the global average and are also included in the top 10 % worldwide by prominence. There is a tendency that data-driven techniques (e.g., machine learning, data mining, neural network, and natural language processing) and their applications to a variety of decision making problems (such as those related to sentiment analysis, electronic commerce, information systems, Internet of Things, social media, and cybersecurity) are attracting more and more attention worldwide.

This work provides a complete bibliometric overview of DSS journal and uses a very diverse range of bibliometric indicators and techniques to identify the leading trends and evolutionary patterns. However, some general limitations still appear when developing a bibliometric analysis. First, as the results are mainly based on the bibliometric data provided by the Scopus database, several limitations stem from the database. For example, the 3537 documents of the journal directly retrieved from Scopus contain 16 irrelevant documents that need to be manually removed. For ease of the graphical mapping analysis, we used the bibliographic data collected from the 3537 documents, which may lead to minor alterations to the current results obtained. Moreover, Scopus uses full counting that gives one unit to each participating entity (e.g., co-author, co-authoring institution, and co-authoring country/territory), assuming the size of the contribution that a collaborative paper makes to scientific production is in principle equal to that of a non-collaborative one [153,154]. To mitigate this limitation, we considered the fractional counting for graphical mapping in Section 3. Secondly, this study provides the current picture of DSS journal considering the bibliographic data between 1985 and 2023. However, the results can change in the future as other contributing variables gain more importance in the academic community. Finally, each research topic has different publication and citation characteristics, so it is not easy to compare the results with different subfields [155]. Note that the platform SciVal of Scopus, with the introduction of the FWCI and the prominence percentile metrics, provides one way to solve this issue.

CRediT authorship contribution statement

Li Guan: Data curation, Formal analysis, Investigation, Methodology, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing. **José M. Merigó:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Software, Supervision, Validation, Visualization, Writing – review & editing. **Ghassan Beydoun:** Formal analysis, Investigation, Validation, Visualization, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Methodology

Bibliometrics is the research field of library and information sciences that quantitatively studies bibliographic material by applying mathematics and statistical methods [156,157]. There have been many definitions and discussions in terms of bibliometrics [150,158–162]. Bibliometric analysis is very useful for deciphering and mapping the cumulative scientific knowledge and evolutionary development of various research areas by analyzing large volumes of unstructured data in a rigorous way [11,68,150]. Generally, the bibliographic elements to be analyzed, such as title, abstract, author

keywords, author names, institutions, journal name, references, and citations, can be automatically or semi-automatically extracted from the datasets retrieved from scientific databases (e.g., Scopus and WoS). The quantitative nature of bibliometric analysis can produce an objective overview of the bibliography and keep scholars' biases in check, which distinguishes it from systematic literature reviews that tend to rely on qualitative techniques and are easily affected by interpretation bias [150,161]. In addition, bibliometric analysis is also recognized as a manifestation of big data analytics through machine learning of scholarly research to extract massive bibliographic data and discover their latent relationships and equivalent clusters [163], making it possible to obtain more deep insights from large-scale corpus [63].

Note that bibliometric studies and other related approaches have been conducted for decades since leading pioneers, such as Eugene Garfield (who identified the importance of the citation and proposed the idea of the Science Citation Index in the 1950s as a database for capturing citations) [164,165], started growing this research discipline [103,166]. Over the years, especially powered by the rapid development of computers and internet infrastructure, bibliometric analysis has gained immense popularity and become a fundamental methodology for reviewing the performance and mapping the scientific character of scholarly research through classifying a set of bibliographic documents, measuring publication and collaboration patterns, comparing the performance, developing representative summaries of the leading results, and exploring the intellectual structure [8,10,158].

The extensive application of bibliometrics has been found to analyze a variety of issues including topics [90,105,167], journals [10,168,169], authors [153,170,171], institutions [172,173], and countries/regions [70,174,175]. Moreover, there are thousands of bibliometric studies in a wide range of scientific fields, such as mathematics [64,176], computer science [93,94,177], engineering [167,178], OR&MS [105,179,180], economics [30,175], business [48,181], management [182–184], medicine [185], psychology [186], physics [187], chemistry [188], geography [189], among others.

For example, in the field of OR&MS, Merigó and Yang [105] presented a general bibliometric overview of the research performed in OR&MS over the last decades, while Liao et al. [190] conducted a bibliometric analysis for highly cited papers in the field during the years of 2008–2017 included in the Essential Science Indicators database, and Laengle et al. [172] studied the most productive and influential research institutions in OR&MS using bibliometric methods. Kaffash et al. [191] reviewed the Big Data algorithms and their applications in intelligent transportation systems based on a bibliometric analysis. Shukla et al. [71] provided a bibliometric overview of the field of Type-2 fuzzy sets and systems between 1997 and 2017. Demir et al. [90] performed a thorough bibliometric analysis of sensitivity analysis within the scope of MCDM, and Liao et al. [192] presented the trends and hotspots regarding Z-number-based decision analysis methods and applications from a bibliometric perspective.

This study focuses on the bibliometric analysis of a specific journal, namely DSS, to provide a broad picture of the leading trends in the journal. This type of analysis of the publications of a particular journal is of importance because it helps with uncovering significant journal features and identifying the key elements and influential factors most associated with the journal, from which readers and future journal authors can get well-researched and informative insights. This work uses a diverse range of bibliometric indicators [10,193–195] to represent the bibliographic data in a complete way and investigate various bibliometric issues of DSS journal [196], including the publication and citation structure, most cited papers, most cited documents by the journal's publications, citing articles, leading authors, institutions, countries/territories, supranational regions, author keywords, and topics.

The total number of publications and the total number of citations are the most basic indicators to measure productivity and influence, respectively [10,197,198]. Additionally, some of the well-known bibliometric indicators are also used in the study, such as the *h*-index [198], the ratio of citations per paper [9,57], citation thresholds [9,64], journal IF [199,200], and CiteScore [8,10]. Note that different ranking results for the same variable can be obtained in this study, so readers can understand the data according to their particular interests and in the meantime detect the strengths and opportunities of DSS journal.

Specifically, the *h*-index, developed by Jorge E. Hirsch in 2005 [198], is used to measure the importance of a set of documents by involving the aspects of productivity and influence. If the X number of documents have received at least X number of citations for each of the documents and at the same time, there are no $X+1$ documents that have received $X+1$ citations or more, then this set of documents has an *h*-index of X. It is worth noting that since the introduction of the *h*-index, it has been further extended and generalized by many researchers [201–204]. The ratio of citations per paper, obtained through dividing the total citations by the number of papers receiving them, can quantify the average influence of a specific set of cited papers. In this work, the *h*-index and the ratio of citations per paper are used to measure the impact of journals, authors, institutions, countries/territories, and supranational regions as they can be applied to any collection of cited papers. Moreover, several citation thresholds are also adopted in the citation analysis to identify the number of documents that have reached a certain number of citations (e.g., 10, 50, 200, and 500 citations), thus supporting a comparative analysis of quality contributions.

For analyzing a journal's quality and impact, some prominent indicators calculated from the data indexed in the WoS Core Collection database and available in JCR [6,195] have also been included in this work. The journal IF is one of the most influential journal metrics [193,205], which was originally developed by Garfield and Sher in 1963 [200] as a way of choosing academic journals to include in the Science Citation Index database. It is simply a two-year mean citation per paper for a journal based on the number of citations in year n to the papers published in the previous two years (i.e., the years n–1 and n–2). It is generally agreed that the IF has several benefits for evaluating research but is also accompanied by multiple deficiencies [193,206,207]. For example, the IF depends heavily on the research field, and it can be easily manipulated by journals [160,193]. The immediacy index for a journal, which is a 1-year IF, represents the mean citations in year n to the papers published in year n, while the 5-year IF of a journal is calculated by dividing the number of citations in year n to the papers published from n–5 to n–1 by the total number of publications in the five previous years [10,68]. The article influence score is used to quantify the average influence per paper for the articles of a journal [10,70]. Several other journal indicators published by JCR are also considered in this study, including the journal IF rank, quartile, and percentile for each WoS category that is taken into account, as well as the average journal IF percentile [6].

Furthermore, Elsevier's Scopus CiteScore [7] is employed in the study as a supplement to analyze and compare the quality of academic journals. Based on Scopus data, CiteScore measures the average citations received per document published in a particular journal using a four-year window [208]. This study also uses some other bibliometric indicators in several particular cases, including the citations per year ratio to measure the average yearly influence of a document, the university rankings from the Academic Ranking of World Universities (ARWU) and the Quacquarelli and Symonds (QS) University Ranking for institution analysis, the publications/citations per million inhabitants for analyzing countries/territories and supranational regions, as well as the field-weighted citation impact [151] and worldwide prominence percentile from Scopus for topical analysis.

The bibliographic data for the study is mainly collected from the Scopus database that covers all the publications of DSS journal since the journal's

origin in 1985. The search process was carried out between June and November 2024. Firstly, the keyword "Decision Support Systems" is used under the "Title" of the "Sources" option to retrieve all the documents published in DSS journal, and the initial search produces a total of 3820 documents. Secondly, by selecting the "Final" publication stage and excluding the publications of 2024 and 2025, we obtain 3643 documents published between 1985 and 2023 in the journal. Further, to especially focus on research contributions, we implement an additional filter by selecting only "Article", "Review", and "Conference Paper" under the "Document Type" option and thus obtain a result of 3537 documents. After double-checking the documents retrieved, five conference information documents and 11 editorials have been further removed, resulting in 3521 documents finally obtained from Scopus to be used for the study. Observe that although the DSS journal's publications in Issues 2–4 of Volume 34 were published in 2002, they are categorized into the year 2003 on the webpage of the journal. However, of these issues, the Scopus database incorporates seven of the documents in Issue 4 of Volume 34 as the publications in 2002. Thus, to solve the problem of inconsistency and reduce the difficulty in manually identifying the bibliographic information of affected documents, we mainly rely on the data indexed in Scopus for a bibliometric analysis of the journal. As of November 2024, the journal has received 215,437 citations coming from the documents available in Scopus, with an average of 61.19 citations per paper. The *h*-index is 197, meaning that of the 3521 documents published in DSS journal, 197 documents have obtained 197 citations or more, and at the same time, there are not 198 documents that have 198 citations or more.

In addition, we use the data retrieved from the WoS Core Collection database in five particular cases. Specifically, the profile of DSS journal is analyzed based on the key indicators in the JCR of WoS (as shown in Table 2), and the publication records of leading journals in OR&MS and other related fields are compared by also collecting the data indexed in the WoS Core Collection database (as shown in Table 3), in addition to the CiteScore values of the leading journals. Moreover, in the cases of analyzing the most cited documents by the DSS journal's publications (as shown in Table 5), the co-citation of documents cited in DSS journal (as shown in Fig. 9), and the bibliographic coupling of institutions publishing in DSS journal (as shown in Fig. 13), we also use the WoS Core Collection database in the search process of related bibliographic information of the DSS journal's publications because more practical resources are provided for the three cases. Note that currently the WoS Core Collection database only covers the publications of DSS journal starting from 1991. This search process uses the keyword "Decision Support Systems" under the "Publication Titles" of the "Documents" option to retrieve all the available documents. Then, only the "Articles", "Review Articles", and "Proceeding Papers" published between 1991 and 2023 (considering the "Final Publication Year") are selected. This search in the WoS Core Collection database produces a total of 3373 documents of the journal to be studied for the aforementioned three analyses.

To further analyze the bibliometric results, this study also develops a graphical analysis of the bibliographical material by using the VOSviewer software [12]. VOSviewer is an efficient graphical user interface-based software that can collect large volumes of bibliographic data from a scientific database (e.g., Scopus and WoS) and generate various graphical maps by using different bibliometric techniques and algorithms [10,12,58]. It has been widely applied in a number of bibliometric studies for constructing and visualizing bibliometric networks of scientific actors, such as authors, journals, documents, institutions, countries/territories, keywords, terms, and other aspects [63,166,209].

In the graphical maps of bibliometric networks, the units of analysis are the nodes, while the relations among them are represented by links between pairs of nodes [12]. It is worth noting that the size of a node increases with an item's relevance, and a link is strengthened when two items are highly connected [10,57]. In addition, to minimize a weighted sum of squared Euclidean distances between all pairs of items through an optimization process, the VOSviewer software maps the items in such a way that the distance between any pair of items reflects their similarity as accurately as possible [12,210]. Moreover, VOSviewer has its own clustering technique [211] to partition items into different groups, and each cluster has a color that indicates the group to which the cluster is assigned [212]. There are many other network visualization software tools prominently used for bibliometric analysis, such as CitNetExplorer [213], BibExcel [214], SciMAT [215], Science of Science (Sci2) Tool [216], *bibliometrix* R-package [217], CiteSpace [218], UCINET [219], and Gephi [220].

In the graphical mapping of the bibliometric results of DSS journal, we focus on the bibliometric techniques in terms of co-citation [13], bibliographic coupling [14], and co-occurrence of author keywords [9,10]. Recall that co-citation is defined as the frequency with which two items are cited together [13]. Co-citation analysis uses co-citation counts to construct measures of similarity between documents, authors, or journals, with the fundamental assumption that the more two items are cited together, the more likely it is that their content is related [11,150,221]. This study implements co-citation analysis for the journals, documents, and authors cited in DSS journal. When building maps in VOSviewer with co-citation, the size of the nodes (e.g., journals, documents, or authors) measures the total number of citations received, and the network links visualize the strongest co-citations.

Bibliographic coupling uses the number of references shared by two documents as a measure of the similarity between them [14]. This technique operates on the assumption that the two documents sharing common references are also similar in their content, and the larger the overlap between the bibliographies of documents, the stronger the connection is between them [60,221]. This work implements the bibliographic coupling for analyzing the documents published in DSS journal and the authors, institutions, and countries/territories publishing in the journal. This approach can also be applied when there are several journals in the analysis [197], but the current study only considers documents of the DSS journal. Note bibliographic coupling is fixed and invariant once relevant documents considered are published, as the list of references will no longer change [221]. Using VOSviewer, the size of the nodes indicates the number of related documents published (except for the type regarding document analysis where the size of the nodes represents the total number of citations received), and the network links illustrate the strongest bibliographic coupling.

Another bibliometric technique used in the study is the co-occurrence of keywords which examines the frequency and patterns of keywords within a journal [9]. We consider the author keywords of the DSS journal's publications that usually appear below the abstract on the title page. The reason is that the specific set of keywords selected by the author(s) of a document directly focuses on the document's main topics. Although notable keywords can also be extracted from document titles, abstracts, or full texts for the analysis, this approach will introduce noise into the data (e.g., some keywords retrieved can be very general like "method", "model", and so on) as the algorithms have difficulty distinguishing the importance of keywords in large corpora of text [150,166,221]. The co-occurrence of author keyword analysis identifies the most frequent keywords in DSS journal and pairs of keywords used more frequently in the same documents [9,64], which is pivotal for understanding the thematic focus of the journal and pinpointing the key topics and concepts that are prevalent within the published research. In the VOSviewer graphical maps regarding the co-occurrence of author keywords, the size of the nodes represents the number of occurrences of the keywords, and the network links visualize the most frequent co-occurrence of keywords.

The methodology used in this paper is summarized in Fig. A.1. The figure details steps and features of the bibliometric study following the scientific procedures and rationales for systematic literature reviews (SPAR-4-SLR) protocol [10,150,222].

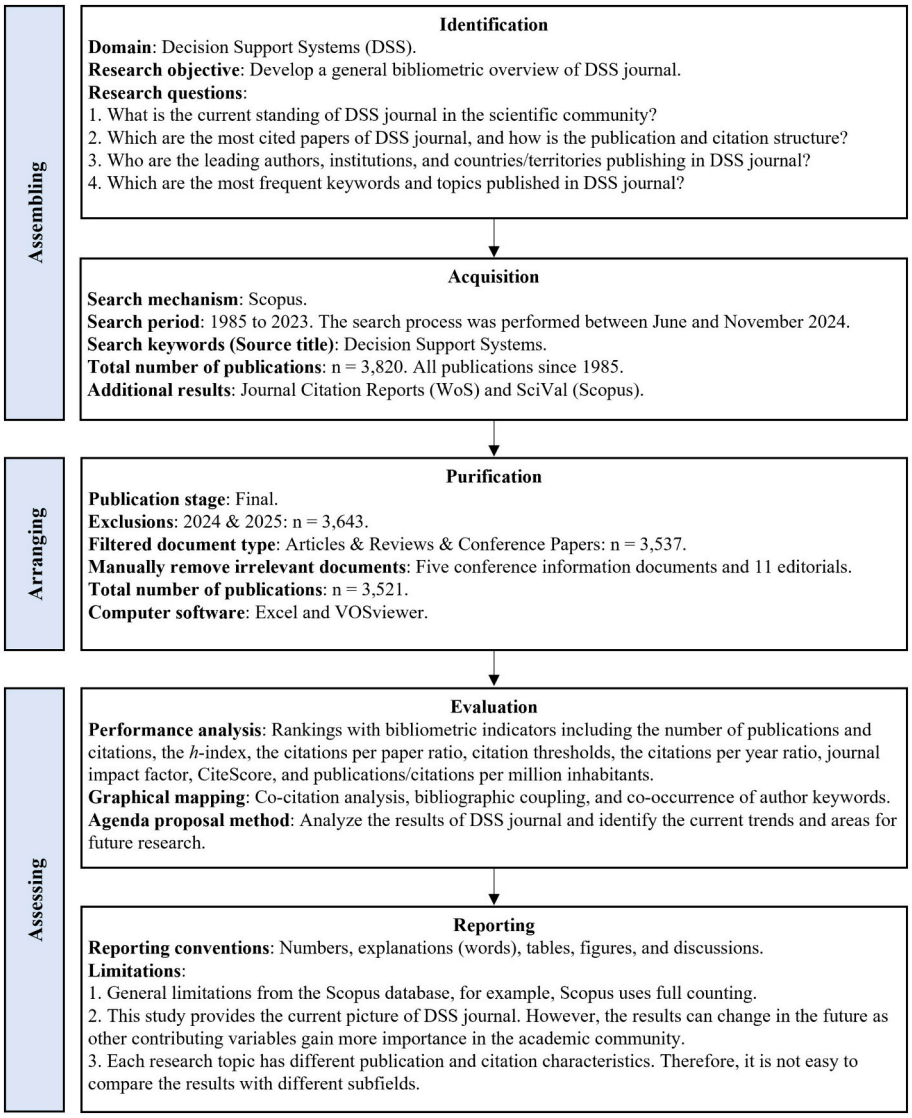

Fig. A.1. Procedure of the study based on the SPAR-4-SLR protocol.

Data availability

Data will be made available on request.

References

[1] H.-J. Schneider, B. Whinston Andrew, Editorial, Decis. Support. Syst. 1 (1985) 1–4.
[2] J.R. Marsden, Transition II, Decis. Support. Syst. 64 (2014), https://doi.org/10.1016/j.dss.2014.07.001.
[3] E.H. Fredriksson, The Dutch publishing scene: Elsevier and North-Holland, A Century of Science Publishing, IOS Press, in, 2001, pp. 61–76.
[4] A.B. Whinston, Editorial, Decis. Support. Syst. 8 (1992) i–ii.
[5] C.W. Holsapple, A.B. Whinston, Introduction to ISDSS research contributions, Decis. Support. Syst. 9 (1993) 311–312, https://doi.org/10.1016/0167-9236(93)90043-3.
[6] Clarivate, Journal Citation Reports. https://www-webofscience-com, 2025.
[7] Elsevier, Scopus metrics: CiteScore, 2025. https://www.elsevier.com/products/scopus/metrics/citescore.
[8] C. Cancino, J.M. Merigó, F. Coronado, Y. Dessouky, M. Dessouky, Forty years of computers & industrial engineering: a bibliometric analysis, Comput. Ind. Eng. 113 (2017) 614–629, https://doi.org/10.1016/j.cie.2017.08.033.
[9] M. Callon, J.P. Courtial, W.A. Turner, S. Bauin, From translations to problematic networks: an introduction to co-word analysis, Soc. Sci. Inf. 22 (1983) 191–235, https://doi.org/10.1177/053901883022002003.
[10] L. Guan, G. Laporte, J.M. Merigó, S. Nickel, I. Rahimi, F. Saldanha-da-Gama, 50 years of computers & operations research: a bibliometric analysis, Comput. Oper. Res. 175 (2025) 106910, https://doi.org/10.1016/j.cor.2024.106910.
[11] L. Guan, J.M. Merigó, R.E. Löfstedt, J.K. Wardman, Twenty-five years of the journal of risk research: a bibliometric overview, J. Risk Res. 27 (2024) 857–900, https://doi.org/10.1080/13669877.2024.2377093.
[12] N.J. van Eck, L. Waltman, Software survey: VOSviewer, a computer program for bibliometric mapping, Scientometrics 84 (2010) 523–538, https://doi.org/10.1007/s11192-009-0146-3.
[13] H. Small, Co-citation in the scientific literature: a new measure of the relationship between two documents, J. Am. Soc. Inf. Sci. 24 (1973) 265–269, https://doi.org/10.1002/asi.4630240406.
[14] M.M. Kessler, Bibliographic coupling between scientific papers, Am. Doc. 14 (1963) 10–25, https://doi.org/10.1002/asi.5090140103.
[15] K.J. Arrow, B.D. Bernheim, M.S. Feldstein, D.L. McFadden, J.M. Poterba, R. M. Solow, 100 years of the American economic review: the Top 20 articles, Am. Econ. Rev. 101 (2011) 1–8, https://doi.org/10.1257/aer.101.1.1.
[16] S. Ng, E. Tamer, Five decades of the journal of econometrics: an activity report, J. Econ. 234 (2023) 1–6, https://doi.org/10.1016/j.jeconom.2023.01.017.
[17] R. Meyer, R.S. Winer, Introduction to the JMR 50th anniversary special section, J. Mark. Res. 51 (2014) 83, https://doi.org/10.1509/jmr.51.1.1.
[18] L.M. Wein, Introduction to the 50th anniversary issue of operations research, Oper. Res. 50 (2002) iii, https://doi.org/10.1287/opre.50.1.0.17795.
[19] H. Fujita, J. Lu, Editorial for the special issue: 25th anniversary of knowledge-based systems, Knowl.-Based Syst. 80 (2015) 1–2, https://doi.org/10.1016/j.knosys.2015.02.014.

[20] D. Simchi-Levi, Introduction to the special section: management science's 65th anniversary, Manag. Sci. 67 (2021) 5305, https://doi.org/10.1287/mnsc.2021.4183.

[21] A. Dolgui, Editorial board contributions celebrating the 60th anniversary of IJPR: Parts 1 and 2, Int. J. Prod. Res. 60 (2022) 1–7, https://doi.org/10.1080/00207543.2022.2028990.

[22] R. Monastersky, R. Van Noorden, 150 years of nature: a data graphic charts our evolution, Nature 575 (2019) 22–23, https://doi.org/10.1038/d41586-019-03305-w.

[23] S.R. Barley, 60th anniversary essay: ruminations on how we became a mystery house and how we might get out, Adm. Sci. Q. 61 (2016) 1–8, https://doi.org/10.1177/0001839215624886.

[24] A.I. Khwaja, K. Mangal, Review of economics and statistics over the past 100 years: a counting exercise, Rev. Econ. Stat. 100 (2018) i–v, https://doi.org/10.1162/rest_e_00742.

[25] J. Meredith, 20th anniversary of JOM: an editorial retrospective and prospective, J. Oper. Manag. 20 (2002) 1–18, https://doi.org/10.1016/S0272-6963(01)00082-1.

[26] S.M. Shugan, Editorial: fifty years of marketing science, Mark. Sci. 25 (2006) 551–555, https://doi.org/10.1287/mksc.1060.0251.

[27] D.D. Van Fleet, D.F. Ray, A.G. Bedeian, H.K. Downey, J.G. Hunt, R.W. Griffin, D. Dalton, R.P. Vecchio, K.M. Kacmar, D.C. Feldman, The journal of management's first 30 years, J. Manag. 32 (2006) 477–506, https://doi.org/10.1177/0149206306286715.

[28] M. Savelsbergh, T. Van Woensel, City logistics: challenges and opportunities, Transp. Sci. 50 (2016) 579–590, https://doi.org/10.1287/trsc.2016.0675.

[29] F. Petropoulos, G. Laporte, E. Aktas, S.A. Alumur, C. Archetti, H. Ayhan, M. Battarra, J.A. Bennell, J.M. Bourjolly, J.E. Boylan, M. Breton, D. Canca, L. Charlin, B. Chen, C.T. Cicek, L.A. Cox, C.S.M. Currie, E. Demeulemeester, L. Ding, S.M. Disney, M. Ehrgott, M.J. Eppler, G. Erdoğan, B. Fortz, L.A. Franco, J. Frische, S. Greco, A.J. Gregory, R.P. Hämäläinen, W. Herroelen, M. Hewitt, J. Holmström, J.N. Hooker, T. Işık, J. Johnes, B.Y. Kara, Ö. Karsu, K. Kent, C. Köhler, M. Kunc, Y.H. Kuo, A.N. Letchford, J. Leung, D. Li, H. Li, J. Lienert, I. Ljubić, A. Lodi, S. Lozano, V. Lurkin, S. Martello, I.G. McHale, G. Midgley, J.D. W. Morecroft, A. Mutha, C. Oğuz, S. Petrovic, U. Pferschy, H.N. Psaraftis, S. Rose, L. Saarinen, S. Salhi, J.S. Song, D. Sotiros, K.E. Stecke, A.K. Strauss, İ. Tarhan, C. Thielen, P. Toth, T. Van Woensel, G. Vanden Berghe, C. Vasilakis, V. Vaze, D. Vigo, K. Virtanen, X. Wang, R. Weron, L. White, M. Yearworth, E.A. Yıldırım, G. Zaccour, X. Zhao, Operational research: methods and applications, J. Oper. Res. Soc. 75 (2024) 423–617, https://doi.org/10.1080/01605682.2023.2253852.

[30] R. Kube, A. Löschel, H. Mertens, T. Requate, Research trends in environmental and resource economics: insights from four decades of JEEM, J. Environ. Econ. Manag. 92 (2018) 433–464, https://doi.org/10.1016/j.jeem.2018.08.001.

[31] W.J. Hopp, Fifty years of management science, Manag. Sci. 50 (2004) 1–7, https://doi.org/10.1287/mnsc.1030.0181.

[32] S. Chopra, W. Lovejoy, C. Yano, Five decades of operations management and the prospects ahead, Manag. Sci. 50 (2004) 8–14, https://doi.org/10.1287/mnsc.50.1.8.27056.

[33] P.N. Kolm, R. Tütüncü, F.J. Fabozzi, 60 Years of portfolio optimization: practical challenges and current trends, Eur. J. Oper. Res. 234 (2014) 356–371, https://doi.org/10.1016/j.ejor.2013.10.060.

[34] L.E. Cárdenas-Barrón, K.J. Chung, G. Treviño-Garza, Celebrating a century of the economic order quantity model in honor of Ford Whitman Harris, Int. J. Prod. Econ. 155 (2014) 1–7, https://doi.org/10.1016/j.ijpe.2014.07.002.

[35] D. Dubois, H. Prade, The legacy of 50 years of fuzzy sets: a discussion, Fuzzy Sets Syst. 281 (2015) 21–31, https://doi.org/10.1016/j.fss.2015.09.004.

[36] V. Sarafidis, T. Wansbeek, Celebrating 40 years of panel data analysis: past, present and future, J. Econ. 220 (2021) 215–226, https://doi.org/10.1016/j.jeconom.2020.06.001.

[37] E. Wasil, B. Golden, Celebrating 25 years of AHP-based decision making, Comput. Oper. Res. 30 (2003) 1419–1420, https://doi.org/10.1016/s0305-0548(02)00184-3.

[38] G. Royston, One hundred years of operational research in health - UK 1948-2048, J. Oper. Res. Soc. 60 (2009) S169–S179, https://doi.org/10.1057/jors.2009.14.

[39] K. Hausken, Fifty years of operations research in defense, Eur. J. Oper. Res. 318 (2024) 355–368, https://doi.org/10.1016/j.ejor.2023.12.023.

[40] A. de Zeeuw, The EAERE celebrates its 30th anniversary, Environ. Resour. Econ. 76 (2020) 7–16, https://doi.org/10.1007/s10640-020-00422-3.

[41] C.W.J. Granger, Forecasting-looking back and forward: paper to celebrate the 50th anniversary of the Econometrics Institute at the Erasmus University, Rotterdam, J. Econ. 138 (2007) 3–13, https://doi.org/10.1016/j.jeconom.2006.05.016.

[42] A. Emrouznejad, R. Banker, L. Neralić, Advances in data envelopment analysis: celebrating the 40th anniversary of DEA and the 100th anniversary of Professor Abraham Charnes' birthday, Eur. J. Oper. Res. 278 (2019) 365–367, https://doi.org/10.1016/j.ejor.2019.02.020.

[43] G. Kou, D. Ergu, AHP/ANP theory and its application in technological and economic development, in: The 90th anniversary of Thomas L. Saaty, Technological and Economic Development of Economy 22, 2016, pp. 649–650, https://doi.org/10.3846/20294913.2016.1202353.

[44] J.L. Heck, W.G. Bremser, Six decades of the accounting review: a summary of author and institutional contributors, Account. Rev. 61 (1986) 735–744.

[45] G.W. Schwert, The journal of financial economics: a retrospective evaluation (1974-91), J. Financ. Econ. 33 (1993) 369–424, https://doi.org/10.1016/0304-405x(93)90012-z.

[46] A.C. Inkpen, P.W. Beamish, An analysis of twenty-five years of research in the journal of international business studies, J. Int. Bus. Stud. 25 (1994) 703–713, https://doi.org/10.1057/palgrave.jibs.8490220.

[47] M.J. Cobo, M.A. Martínez, M. Gutiérrez-Salcedo, H. Fujita, E. Herrera-Viedma, 25 years at knowledge-based systems: a bibliometric analysis, Knowl.-Based Syst. 80 (2015) 3–13, https://doi.org/10.1016/j.knosys.2014.12.035.

[48] J.M. Merigó, A. Mas-Tur, N. Roig-Tierno, D. Ribeiro-Soriano, A bibliometric overview of the journal of business research between 1973 and 2014, J. Bus. Res. 68 (2015) 2645–2653, https://doi.org/10.1016/j.jbusres.2015.04.006.

[49] S. Laengle, N.M. Modak, J.M. Merigo, G. Zurita, Twenty-five years of group decision and negotiation: a bibliometric overview, Group Decis. Negot. 27 (2018) 505–542, https://doi.org/10.1007/s10726-018-9582-x.

[50] D. Yu, Z. Xu, Y. Kao, C.T. Lin, The structure and citation landscape of IEEE transactions on fuzzy systems (1994–2015), IEEE Trans. Fuzzy Syst. 26 (2018) 430–442, https://doi.org/10.1109/TFUZZ.2017.2672732.

[51] Q. Wang, X. Sun, The international journal of production research in the past, the present and the future: a bibliometric analysis, Int. J. Prod. Res. 57 (2019) 4676–4691, https://doi.org/10.1080/00207543.2018.1543974.

[52] A.K. Shukla, M. Janmaijaya, A. Abraham, P.K. Muhuri, Engineering applications of artificial intelligence: a bibliometric analysis of 30 years (1988–2018), Eng. Appl. Artif. Intell. 85 (2019) 517–532, https://doi.org/10.1016/j.engappai.2019.06.010.

[53] D. Yu, Z. Xu, W. Wang, A bibliometric analysis of Fuzzy optimization and decision making (2002–2017), Fuzzy Optim. Decis. Making 18 (2019) 371–397, https://doi.org/10.1007/s10700-018-9301-8.

[54] A. Calma, W. Ho, L. Shao, H. Li, Operations research: topics, impact, and trends from 1952–2019, Oper. Res. 69 (2021) 1487–1508, https://doi.org/10.1287/opre.2021.2139.

[55] X. Wang, Y. Chang, Z. Xu, Z. Wang, V. Kadirkamanathan, 50 years of international journal of systems science: a review of the past and trends for the future, Int. J. Syst. Sci. 52 (2021), https://doi.org/10.1080/00207721.2020.1862937.

[56] S. Kraus, S. Kumar, W.M. Lim, J. Kaur, A. Sharma, F. Schiavone, From moon landing to metaverse: tracing the evolution of TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE, Technol. Forecast Soc. Chang. 189 (2023) 122381, https://doi.org/10.1016/j.techfore.2023.122381.

[57] S. Laengle, J.M. Merigó, J. Miranda, R. Słowiński, I. Bomze, E. Borgonovo, R. G. Dyson, J.F. Oliveira, R. Teunter, Forty years of the European journal of operational research: a bibliometric overview, Eur. J. Oper. Res. 262 (2017) 803–816, https://doi.org/10.1016/j.ejor.2017.04.027.

[58] J.M. Merigó, J. Miranda, N.M. Modak, G. Boustras, C. de la Sotta, Forty years of safety science: a bibliometric overview, Saf. Sci. 115 (2019) 66–88, https://doi.org/10.1016/j.ssci.2019.01.029.

[59] C. Wang, M.K. Lim, L. Zhao, M.L. Tseng, C.F. Chien, B. Lev, The evolution of Omega-the international journal of management science over the past 40 years: a bibliometric overview, Omega (United Kingdom) 93 (2020) 102098, https://doi.org/10.1016/j.omega.2019.08.005.

[60] C. Jiang, C.R. Bhat, W.H.K. Lam, A bibliometric overview of transportation research part b: methodological in the past forty years (1979–2019), Transp. Res. B Methodol. 138 (2020) 268–291, https://doi.org/10.1016/j.trb.2020.05.016.

[61] M. Dabić, G. Marzi, B. Vlačić, T.U. Daim, W. Vanhaverbeke, 40 years of excellence: an overview of technovation and a roadmap for future research, Technovation 106 (2021) 102303, https://doi.org/10.1016/j.technovation.2021.102303.

[62] H.K. Baker, S. Kumar, N. Pandey, Forty years of the journal of futures markets: a bibliometric overview, J. Futur. Mark. 41 (2021) 1027–1054, https://doi.org/10.1002/fut.22211.

[63] N. Donthu, S. Kumar, N. Pandey, P. Gupta, Forty years of the international journal of information management: a bibliometric analysis, Int. J. Inf. Manag. 57 (2021) 102307, https://doi.org/10.1016/j.ijinfomgt.2020.102307.

[64] H.K. Baker, S. Kumar, D. Pattnaik, N. Pandey, The journal of accounting and public policy at 40: a bibliometric analysis, J. Account. Public Policy 42 (2023) 107003, https://doi.org/10.1016/j.jaccpubpol.2022.107003.

[65] F. Goerlandt, J. Li, Forty years of risk analysis: a scientometric overview, Risk Anal. 42 (2022) 2253–2274, https://doi.org/10.1111/risa.13853.

[66] G.F. Deng, W.T. Lin, Citation analysis and bibliometric approach for ant colony optimization from 1996 to 2010, Expert Syst. Appl. 39 (2012) 6229–6237, https://doi.org/10.1016/j.eswa.2011.12.001.

[67] M.S. Yin, Fifteen years of grey system theory research: a historical review and bibliometric analysis, Expert Syst. Appl. 40 (2013) 2767–2775, https://doi.org/10.1016/j.eswa.2012.11.002.

[68] J.M. Merigó, A.M. Gil-Lafuente, R.R. Yager, An overview of fuzzy research with bibliometric indicators, Appl. Soft Comput. J. 27 (2015) 420–433, https://doi.org/10.1016/j.asoc.2014.10.035.

[69] D. Yu, Z. Xu, W. Wang, Bibliometric analysis of fuzzy theory research in China: a 30-year perspective, Knowl.-Based Syst. 141 (2018) 188–199, https://doi.org/10.1016/j.knosys.2017.11.018.

[70] H. Liao, M. Tang, X. Zhang, A. Al-Barakati, Detecting and visualizing in the field of hesitant fuzzy sets: a bibliometric analysis from 2009 to 2018, Int. J. Fuzzy Syst. 21 (2019) 1289–1305, https://doi.org/10.1007/s40815-019-00656-4.

[71] A.K. Shukla, S.K. Banshal, T. Seth, A. Basu, R. John, P.K. Muhuri, A bibliometric overview of the field of type-2 fuzzy sets and systems, IEEE Comput. Intell. Mag. 15 (2020) 89–98, https://doi.org/10.1109/MCI.2019.2954669.

[72] D. Yu, Y. Chen, Z. Xu, The longitudinal research of type-2 fuzzy sets domain: from conceptual structure and knowledge diffusion perspectives, Inf. Sci. (N Y) 568 (2021) 317–332, https://doi.org/10.1016/j.ins.2021.03.061.

[73] Y. Chen, Q. Jin, H. Fang, H. Lei, J. Hu, Y. Wu, J. Chen, C. Wang, Y. Wan, Analytic network process: academic insights and perspectives analysis, J. Clean. Prod. 235 (2019) 1276–1294, https://doi.org/10.1016/j.jclepro.2019.07.016.
[74] D. Yu, X. Hong, A theme evolution and knowledge trajectory study in AHP using science mapping and main path analysis, Expert Syst. Appl. 205 (2022) 117675, https://doi.org/10.1016/j.eswa.2022.117675.
[75] V. Pereira, U. Bamel, Charting the managerial and theoretical evolutionary path of AHP using thematic and systematic review: a decadal (2012−2021) study, Ann. Oper. Res. 326 (2023) 635–651, https://doi.org/10.1007/s10479-022-04540-7.
[76] S.H. Zyoud, D. Fuchs-Hanusch, A bibliometric-based survey on AHP and TOPSIS techniques, Expert Syst. Appl. 78 (2017) 158–181, https://doi.org/10.1016/j.eswa.2017.02.016.
[77] S.D. Dao, K. Abhary, R. Marian, A bibliometric analysis of genetic algorithms throughout the history, Comput. Ind. Eng. 110 (2017) 395–403, https://doi.org/10.1016/j.cie.2017.06.009.
[78] X. Mi, M. Tang, H. Liao, W. Shen, B. Lev, The state-of-the-art survey on integrations and applications of the best worst method in decision making: why, what, what for and what's next? Omega (United Kingdom) 87 (2019) 205–225, https://doi.org/10.1016/j.omega.2019.01.009.
[79] X. Peng, J. Dai, A bibliometric analysis of neutrosophic set: two decades review from 1998 to 2017, Artif. Intell. Rev. 53 (2020) 199–255. doi:https://doi.org/10.1007/s10462-018-9652-0.
[80] D. Yu, Z. Xu, W. Pedrycz, Bibliometric analysis of rough sets research, Appl. Soft Comput. J. 94 (2020) 106467, https://doi.org/10.1016/j.asoc.2020.106467.
[81] A.E. Ezugwu, A.K. Shukla, R. Nath, A.A. Akinyelu, J.O. Agushaka, H. Chiroma, P. K. Muhuri, Metaheuristics: a comprehensive overview and classification along with bibliometric analysis, Artif. Intell. Rev. 54 (2021) 4237–4316, https://doi.org/10.1007/s10462-020-09952-0.
[82] A. Panwar, M. Olfati, M. Pant, V. Snasel, A review on the 40 years of existence of data envelopment analysis models: historic development and current trends, Arch. Comput. Methods Eng. 29 (2022) 5397–5426, https://doi.org/10.1007/s11831-022-09770-3.
[83] H. Zhou, Y. Yang, Y. Chen, J. Zhu, Data envelopment analysis application in sustainability: the origins, development and future directions, Eur. J. Oper. Res. 264 (2018) 1–16, https://doi.org/10.1016/j.ejor.2017.06.023.
[84] H. Landström, G. Harirchi, F. Åström, Entrepreneurship: exploring the knowledge base, Res. Policy 41 (2012) 1154–1181, https://doi.org/10.1016/j.respol.2012.03.009.
[85] J.J.M. Ferreira, C.I. Fernandes, S. Kraus, Entrepreneurship research: mapping intellectual structures and research trends, Rev. Manag. Sci. 13 (2019) 181–205, https://doi.org/10.1007/s11846-017-0242-3.
[86] B. Li, Z. Xu, N. Hong, A. Hussain, A bibliometric study and science mapping research of intelligent decision, Cogn. Comput. 14 (2022) 989–1008, https://doi.org/10.1007/s12559-022-09993-3.
[87] L. Barcellos-Paula, I. de La Vega, A.M. Gil-Lafuente, Bibliometric review of research on decision models in uncertainty, 1990–2020, Int. J. Intell. Syst. 37 (2022) 7300–7333, https://doi.org/10.1002/int.22882.
[88] H. Liao, X. Mi, Z. Xu, A survey of decision-making methods with probabilistic linguistic information: bibliometrics, preliminaries, methodologies, applications and future directions, Fuzzy Optim. Decis. Making 19 (2020) 81–134, https://doi.org/10.1007/s10700-019-09309-5.
[89] A.K. Shukla, P.K. Muhuri, A. Abraham, A bibliometric analysis and cutting-edge overview on fuzzy techniques in Big Data, Eng. Appl. Artif. Intell. 92 (2020) 103625, https://doi.org/10.1016/j.engappai.2020.103625.
[90] G. Demir, P. Chatterjee, D. Pamucar, Sensitivity analysis in multi-criteria decision making: a state-of-the-art research perspective using bibliometric analysis, Expert Syst. Appl. 237 (2024) 121660, https://doi.org/10.1016/j.eswa.2023.121660.
[91] J. Wallenius, J.S. Dyer, P.C. Fishburn, R.E. Steuer, S. Zionts, K. Deb, Multiple criteria decision making, multiattribute utility theory: recent accomplishments and what lies ahead, Manag. Sci. 54 (2008) 1336–1349, https://doi.org/10.1287/mnsc.1070.0838.
[92] S. Ben Amor, F. Belaid, R. Benkraiem, B. Ramdani, K. Guesmi, Multi-criteria classification, sorting, and clustering: a bibliometric review and research agenda, Ann. Oper. Res. 325 (2023) 771–793, https://doi.org/10.1007/s10479-022-04986-9.
[93] Y. Li, Z. Xu, X. Wang, X. Wang, A bibliometric analysis on deep learning during 2007–2019, Int. J. Mach. Learn. Cybern. 11 (2020) 2807–2826, https://doi.org/10.1007/s13042-020-01152-0.
[94] C. Wang, X. Cui, S. Zhao, K. Guo, Y. Wang, Y. Song, The application of deep learning in stereo matching and disparity estimation: a bibliometric review, Expert Syst. Appl. 238 (2024) 122006, https://doi.org/10.1016/j.eswa.2023.122006.
[95] R. Dyson, F. Glover, Y. Ijiri, A. Whinston, T. Sueyoshi, New concepts, methodologies and algorithms for business education and research in the 21st century, Decis. Support. Syst. 48 (2010) 427–429, https://doi.org/10.1016/j.dss.2009.06.001.
[96] S.B. Eom, S.M. Lee, J.K. Kim, The intellectual structure of decision support systems (1971-1989), Decis. Support. Syst. 10 (1993) 19–35, https://doi.org/10.1016/0167-9236(93)90003-L.
[97] S.B. Eom, Mapping the intellectual structure of research in decision support systems through author cocitation analysis (1971-1993), Decis. Support. Syst. 16 (1996) 315–338, https://doi.org/10.1016/0167-9236(95)00026-7.
[98] N. Wang, H. Liang, Y. Jia, S. Ge, Y. Xue, Z. Wang, Cloud computing research in the IS discipline: a citation/co-citation analysis, Decis. Support. Syst. 86 (2016) 35–47, https://doi.org/10.1016/j.dss.2016.03.006.
[99] P.B. Keenan, P. Jankowski, Spatial decision support systems: three decades on, Decis. Support. Syst. 116 (2019) 64–76, https://doi.org/10.1016/j.dss.2018.10.010.
[100] S. Tobon, J.L. Ruiz-Alba, J. García-Madariaga, Gamification and online consumer decisions: is the game over? Decis. Support. Syst. 128 (2020) 113167 https://doi.org/10.1016/j.dss.2019.113167.
[101] A.M. Petersen, R.K. Pan, F. Pammolli, S. Fortunato, Methods to account for citation inflation in research evaluation, Res. Policy 48 (2019) 1855–1865, https://doi.org/10.1016/j.respol.2019.04.009.
[102] J.W. Tukey, Exploratory Data Analysis, Addison-Wesley, Reading, MA, 1977.
[103] W. Hussain, J.M. Merigó, I. Rahimi, B. Lev, Half a century of Omega – the international journal of management science: a bibliometric analysis, Omega (United Kingdom) 133 (2025) 103226, https://doi.org/10.1016/j.omega.2024.103226.
[104] A. Jøsang, R. Ismail, C. Boyd, A survey of trust and reputation systems for online service provision, Decis. Support. Syst. 43 (2007) 618–644, https://doi.org/10.1016/j.dss.2005.05.019.
[105] J.M. Merigó, J.B. Yang, A bibliometric analysis of operations research and management science, Omega (United Kingdom) 73 (2017) 37–48, https://doi.org/10.1016/j.omega.2016.12.004.
[106] S.T. March, G.F. Smith, Design and natural science research on information technology, Decis. Support. Syst. 15 (1995) 251–266, https://doi.org/10.1016/0167-9236(94)00041-2.
[107] C.M. Chiu, M.H. Hsu, E.T.G. Wang, Understanding knowledge sharing in virtual communities: an integration of social capital and social cognitive theories, Decis. Support. Syst. 42 (2006) 1872–1888, https://doi.org/10.1016/j.dss.2006.04.001.
[108] D.J. Kim, D.L. Ferrin, H.R. Rao, A trust-based consumer decision-making model in electronic commerce: the role of trust, perceived risk, and their antecedents, Decis. Support. Syst. 44 (2008) 544–564, https://doi.org/10.1016/j.dss.2007.07.001.
[109] J. Lu, D. Wu, M. Mao, W. Wang, G. Zhang, Recommender system application developments: a survey, Decis. Support. Syst. 74 (2015) 12–32, https://doi.org/10.1016/j.dss.2015.03.008.
[110] C.K. Murphy, Combining belief functions when evidence conflicts, Decis. Support. Syst. 29 (2000) 1–9, https://doi.org/10.1016/S0167-9236(99)00084-6.
[111] A. Bhattacherjee, An empirical analysis of the antecedents of electronic commerce service continuance, Decis. Support. Syst. 32 (2001) 201–214, https://doi.org/10.1016/S0167-9236(01)00111-7.
[112] S. Seuring, A review of modeling approaches for sustainable supply chain management, Decis. Support. Syst. 54 (2013) 1513–1520, https://doi.org/10.1016/j.dss.2012.05.053.
[113] T. Zhou, An empirical examination of continuance intention of mobile payment services, Decis. Support. Syst. 54 (2013) 1085–1091, https://doi.org/10.1016/j.dss.2012.10.034.
[114] M.S. Gerber, Predicting crime using Twitter and kernel density estimation, Decis. Support. Syst. 61 (2014) 115–125, https://doi.org/10.1016/j.dss.2014.02.003.
[115] C.M.K. Cheung, D.R. Thadani, The impact of electronic word-of-mouth communication: a literature analysis and integrative model, Decis. Support. Syst. 54 (2012) 461–470, https://doi.org/10.1016/j.dss.2012.06.008.
[116] C.M.K. Cheung, M.K.O. Lee, What drives consumers to spread electronic word of mouth in online consumer-opinion platforms, Decis. Support. Syst. 53 (2012) 218–225, https://doi.org/10.1016/j.dss.2012.01.015.
[117] K.Z.K. Zhang, S.J. Zhao, C.M.K. Cheung, M.K.O. Lee, Examining the influence of online reviews on consumers' decision-making: a heuristic-systematic model, Decis. Support. Syst. 67 (2014) 78–89, https://doi.org/10.1016/j.dss.2014.08.005.
[118] C.M.K. Cheung, M.K.O. Lee, A theoretical model of intentional social action in online social networks, Decis. Support. Syst. 49 (2010) 24–30, https://doi.org/10.1016/j.dss.2009.12.006.
[119] Y.H. Kim, D.J. Kim, K. Wachter, A study of mobile user engagement (MoEN): engagement motivations, perceived value, satisfaction, and continued engagement intention, Decis. Support. Syst. 56 (2013) 361–370, https://doi.org/10.1016/j.dss.2013.07.002.
[120] M. Salehan, D.J. Kim, Predicting the performance of online consumer reviews: a sentiment mining approach to big data analytics, Decis. Support. Syst. 81 (2016) 30–40, https://doi.org/10.1016/j.dss.2015.10.006.
[121] M.H. Hsu, C.M. Chiu, Internet self-efficacy and electronic service acceptance, Decis. Support. Syst. 38 (2004) 369–381, https://doi.org/10.1016/j.dss.2003.08.001.
[122] E.W.T. Ngai, Y. Hu, Y.H. Wong, Y. Chen, X. Sun, The application of data mining techniques in financial fraud detection: a classification framework and an academic review of literature, Decis. Support. Syst. 50 (2011) 559–569, https://doi.org/10.1016/j.dss.2010.08.006.
[123] E.W.T. Ngai, A. Gunasekaran, A review for mobile commerce research and applications, Decis. Support. Syst. 43 (2007) 3–15, https://doi.org/10.1016/j.dss.2005.05.003.
[124] T. Herath, H.R. Rao, Encouraging information security behaviors in organizations: role of penalties, pressures and perceived effectiveness, Decis. Support. Syst. 47 (2009) 154–165, https://doi.org/10.1016/j.dss.2009.02.005.
[125] J.P. Shim, M. Warkentin, J.F. Courtney, D.J. Power, R. Sharda, C. Carlsson, Past, present, and future of decision support technology, Decis. Support. Syst. 33 (2002) 111–126, https://doi.org/10.1016/S0167-9236(01)00139-7.
[126] X. Luo, H. Li, J. Zhang, J.P. Shim, Examining multi-dimensional trust and multi-faceted risk in initial acceptance of emerging technologies: an empirical study of mobile banking services, Decis. Support. Syst. 49 (2010) 222–234, https://doi.org/10.1016/j.dss.2010.02.008.

[127] K.Z.K. Zhang, M. Benyoucef, Consumer behavior in social commerce: a literature review, Decis. Support. Syst. 86 (2016) 95–108, https://doi.org/10.1016/j.dss.2016.04.001.
[128] P. Cortez, A. Cerdeira, F. Almeida, T. Matos, J. Reis, Modeling wine preferences by data mining from physicochemical properties, Decis. Support. Syst. 47 (2009), https://doi.org/10.1016/j.dss.2009.05.016, 547–533.
[129] S. Moro, P. Cortez, P. Rita, A data-driven approach to predict the success of bank telemarketing, Decis. Support. Syst. 62 (2014) 22–31, https://doi.org/10.1016/j.dss.2014.03.001.
[130] R.L. Wilson, R. Sharda, Bankruptcy prediction using neural networks, Decis. Support. Syst. 11 (1994) 545–557, https://doi.org/10.1016/0167-9236(94)90024-8.
[131] W. Duan, B. Gu, A.B. Whinston, Do online reviews matter? - An empirical investigation of panel data, Decis. Support. Syst. 45 (2008) 1007–1016, https://doi.org/10.1016/j.dss.2008.04.001.
[132] Q. Cao, W. Duan, Q. Gan, Exploring determinants of voting for the "helpfulness" of online user reviews: a text mining approach, Decis. Support. Syst. 50 (2011) 511–521, https://doi.org/10.1016/j.dss.2010.11.009.
[133] H. Xu, X. Luo, J.M. Carroll, M.B. Rosson, The personalization privacy paradox: an exploratory study of decision making process for location-aware marketing, Decis. Support. Syst. 51 (2011) 42–52, https://doi.org/10.1016/j.dss.2010.11.017.
[134] F.D. Davis, Perceived usefulness, perceived ease of use, and user acceptance of information technology, MIS Q. 13 (1989) 319–340, https://doi.org/10.2307/249008.
[135] C. Fornell, D.F. Larcker, Evaluating structural equation models with unobservable variables and measurement error, J. Mark. Res. 18 (1981) 39–50, https://doi.org/10.1177/002224378101800104.
[136] P.M. Podsakoff, S.B. MacKenzie, J.Y. Lee, N.P. Podsakoff, Common method biases in behavioral research: a critical review of the literature and recommended remedies, J. Appl. Psychol. 88 (2003) 879–903, https://doi.org/10.1037/0021-9010.88.5.879.
[137] J.R. Quinlan, C4.5: Programs for Machine Learning, Morgan Kaufmann, United States, 2014.
[138] L.A. Zadeh, Fuzzy sets, Inf. Control. 8 (1965) 338–353, https://doi.org/10.1016/S0019-9958(65)90241-X.
[139] J.C. Nunnally, Psychometric Theory, 2nd ed., McGraw-Hill, New York, 1978.
[140] H.A. Simon, The New Science of Management Decision, revised edition, Prentice-Hall, Englewood Cliffs, New Jersey, 1977.
[141] A. Tversky, D. Kahneman, Judgment under uncertainty: heuristics and biases, Science 185 (1974) (1979) 1124–1131, https://doi.org/10.1126/science.185.4157.1124.
[142] D. Kahneman, A. Tversky, Prospect theory: an analysis of decision under risk, Econometrica 47 (1979) 263–292, https://doi.org/10.2307/1914185.
[143] T.L. Saaty, The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation, McGraw-Hill, New York, 1980.
[144] N.J. van Eck, L. Waltman, VOSviewer Manual, Leiden University, CWTS, Netherlands, 2023 https://www.vosviewer.com/getting-started#vosviewer-manual.
[145] SciVal, Quick Reference Guide, London, UK, 2024.
[146] J.A. Chevalier, D. Mayzlin, The effect of word of mouth on sales: online book reviews, J. Mark. Res. 43 (2006) 345–354, https://doi.org/10.1509/jmkr.43.3.345.
[147] R.H. Sprague, E.D. Carlson, Building Effective Decision Support Systems, Prentice Hall, Englewood Cliffs, New Jersey, 1982.
[148] A.R. Hevner, S.T. March, J. Park, S. Ram, Design science in information systems research, MIS Q. 28 (2004) 75–105, https://doi.org/10.2307/25148625.
[149] S. Marston, Z. Li, S. Bandyopadhyay, J. Zhang, A. Ghalsasi, Cloud computing — The business perspective, Decis. Support. Syst. 51 (2011) 176–189, https://doi.org/10.1016/j.dss.2010.12.006.
[150] N. Donthu, S. Kumar, D. Mukherjee, N. Pandey, W.M. Lim, How to conduct a bibliometric analysis: an overview and guidelines, J. Bus. Res. 133 (2021) 285–296, https://doi.org/10.1016/j.jbusres.2021.04.070.
[151] A. Purkayastha, E. Palmaro, H.J. Falk-Krzesinski, J. Baas, Comparison of two article-level, field-independent citation metrics: Field-Weighted Citation Impact (FWCI) and Relative Citation Ratio (RCR), J. Inf. Secur. 13 (2019) 635–642, https://doi.org/10.1016/j.joi.2019.03.012.
[152] R. Klavans, K.W. Boyack, Research portfolio analysis and topic prominence, J. Inf. Secur. 11 (2017) 1158–1174, https://doi.org/10.1016/j.joi.2017.10.002.
[153] P.M. Podsakoff, S.B. MacKenzie, N.P. Podsakoff, D.G. Bachrach, Scholarly influence in the field of management: a bibliometric analysis of the determinants of University and author impact in the management literature in the past quarter century, J. Manag. 34 (2008) 341–720, https://doi.org/10.1177/0149206308319533.
[154] H.F. Moed, Citation Analysis in Research Evaluation, Springer, Dordrecht, The Netherlands, 2005.
[155] J.P. Andersen, Field-level differences in paper and author characteristics across all fields of science in web of science, 2000–2020, Quant. Sci. Stud. 4 (2023) 394–422, https://doi.org/10.1162/qss_a_00246.
[156] A. Pritchard, Statistical bibliography or bibliometrics? J. Doc. 25 (1969) 348–349.
[157] R.N. Broadus, Toward a definition of "bibliometrics,", Scientometrics 12 (1987) 373–379, https://doi.org/10.1007/BF02016680.
[158] J. Bar-Ilan, Informetrics at the beginning of the 21st century-a review, J. Inf. Secur. 2 (2008) 1–52, https://doi.org/10.1016/j.joi.2007.11.001.
[159] W.W. Hood, C.S. Wilson, The literature of bibliometrics, scientometrics, and informetrics, Scientometrics 52 (2001) 291–314, https://doi.org/10.1023/A:1017919924342.
[160] J. Mingers, L. Leydesdorff, A review of theory and practice in scientometrics, Eur. J. Oper. Res. 246 (2015) 1–19, https://doi.org/10.1016/j.ejor.2015.04.002.
[161] W.M. Lim, S. Kumar, F. Ali, Advancing knowledge through literature reviews: 'what', 'why', and 'how to contribute, Serv. Ind. J. 42 (2022) 481–513, https://doi.org/10.1080/02642069.2022.2047941.
[162] O. Öztürk, R. Kocaman, D.K. Kanbach, How to design bibliometric research: an overview and a framework proposal, Rev. Manag. Sci. 18 (2024) 3333–3361, https://doi.org/10.1007/s11846-024-00738-0.
[163] S. Kumar, D. Sharma, S. Rao, W.M. Lim, S.K. Mangla, Past, present, and future of sustainable finance: insights from big data analytics through machine learning of scholarly research, Ann. Oper. Res. (2022), https://doi.org/10.1007/s10479-021-04410-8.
[164] E. Garfield, Citation indexes for science: a new dimension in documentation through association of ideas, Science 122 (1955) (1979) 108–111, https://doi.org/10.1126/science.122.3159.108.
[165] E. Garfield, Citation analysis as a tool in journal evaluation, Science 178 (1972) (1979) 471–479, https://doi.org/10.1126/science.178.4060.471.
[166] A. Figuerola-Wischke, J.M. Merigó, A.M. Gil-Lafuente, F.E. Kydland, L. Amiguet, The Scandinavian journal of economics at 125: a bibliometric overview, Scand. J. Econ. 126 (2024) 643–697, https://doi.org/10.1111/sjoe.12582.
[167] E. Tunstel, M.J. Cobo, E. Herrera-Viedma, I.J. Rudas, L. Trajkovic Di Filev, C.L. P. Chen, W. Pedrycz, M.H. Smith, R. Kozma, Systems science and engineering research in the context of systems, man, and cybernetics: recollection, trends, and future directions, IEEE Trans. Syst. Man Cybern. Syst. 51 (2021) 5–21, https://doi.org/10.1109/TSMC.2020.3043192.
[168] V. Chiu, Q. Liu, B. Muehlmann, A.A. Baldwin, A bibliometric analysis of accounting information systems journals and their emerging technologies contributions, Int. J. Account. Inf. Syst. 32 (2019) 24–43, https://doi.org/10.1016/j.accinf.2018.11.003.
[169] J.M. Merigó, F. Blanco-Mesa, A.M. Gil-Lafuente, R.R. Yager, Thirty years of the international journal of intelligent systems: a bibliometric review, Int. J. Intell. Syst. 32 (2017) 526–554, https://doi.org/10.1002/int.21859.
[170] T. Coupé, Revealed performances: worldwide rankings of economists and economics departments, 1990–2000, J. Eur. Econ. Assoc. 1 (2003) 1309–1345, https://doi.org/10.1162/154247603322752557.
[171] R. Van Noorden, B. Maher, R. Nuzzo, The top 100 papers, Nature 514 (2014) 550–553, https://doi.org/10.1038/514550a.
[172] S. Laengle, J.M. Merigó, N.M. Modak, J.B. Yang, Bibliometrics in operations research and management science: a university analysis, Ann. Oper. Res. 294 (2020) 769–813, https://doi.org/10.1007/s10479-018-3017-6.
[173] J.D. Linton, Perspective: ranking business schools on the management of technology, J. Prod. Innov. Manag. 21 (2004) 416–430, https://doi.org/10.1111/j.0737-6782.2004.00095.x.
[174] J.M. Merigó, C.A. Cancino, F. Coronado, D. Urbano, Academic research in innovation: a country analysis, Scientometrics 108 (2016) 559–593, https://doi.org/10.1007/s11192-016-1984-4.
[175] C.A. Bonilla, J.M. Merigó, C. Torres-Abad, Economics in Latin America: a bibliometric analysis, Scientometrics 105 (2015) 1239–1252, https://doi.org/10.1007/s11192-015-1747-7.
[176] H. Behrens, P. Luksch, Mathematics 1868–2008: a bibliometric analysis, Scientometrics 86 (2011) 179–194, https://doi.org/10.1007/s11192-010-0249-x.
[177] Y.M. Guo, Z.L. Huang, J. Guo, X.R. Guo, H. Li, M.Y. Liu, S. Ezzeddine, M.J. Nkeli, A bibliometric analysis and visualization of blockchain, Futur. Gener. Comput. Syst. 116 (2021) 316–332, https://doi.org/10.1016/j.future.2020.10.023.
[178] M. De Iuliis, A. Cardoni, G. Paolo Cimellaro, Resilience and safety of civil engineering systems and communities: a bibliometric analysis for mapping the state-of-the-art, Saf. Sci. 174 (2024) 106470, https://doi.org/10.1016/j.ssci.2024.106470.
[179] A. Pilkington, J. Meredith, The evolution of the intellectual structure of operations management—1980–2006: a citation/co-citation analysis, J. Oper. Manag. 27 (2009) 185–202, https://doi.org/10.1016/j.jom.2008.08.001.
[180] G. Shang, B. Saladin, T. Fry, J. Donohue, Twenty-six years of operations management research (1985–2010): authorship patterns and research constituents in eleven top rated journals, Int. J. Prod. Res. 53 (2015) 6161–6197, https://doi.org/10.1080/00207543.2015.1037935.
[181] S. Verma, A. Gustafsson, Investigating the emerging COVID-19 research trends in the field of business and management: a bibliometric analysis approach, J. Bus. Res. 118 (2020) 253–261, https://doi.org/10.1016/j.jbusres.2020.06.057.
[182] A.R. Ramos-Rodrígue, J. Ruíz-Navarro, Changes in the intellectual structure of strategic management research: a bibliometric study of the strategic management journal, 1980–2000, Strateg. Manag. J. 25 (2004) 981–1004, https://doi.org/10.1002/smj.397.
[183] R. Vogel, W.H. Güttel, The dynamic capability view in strategic management: a bibliometric review, Int. J. Manag. Rev. 15 (2013) 426–446, https://doi.org/10.1111/ijmr.12000.
[184] M.P. Markoulli, C.I.S.G. Lee, E. Byington, W.A. Felps, Mapping human resource management: reviewing the field and charting future directions, Hum. Resour. Manag. Rev. 27 (2017) 367–396, https://doi.org/10.1016/j.hrmr.2016.10.001.
[185] C.R. Sugimoto, Y.Y. Ahn, E. Smith, B. Macaluso, V. Larivière, Factors affecting sex-related reporting in medical research: a cross-disciplinary bibliometric analysis, Lancet 393 (2019) 550–559, https://doi.org/10.1016/S0140-6736(18)32995-7.

[186] N. Donthu, S. Kumar, D. Pattnaik, W.M. Lim, A bibliometric retrospection of marketing from the lens of psychology: insights from psychology & marketing, Psychol. Mark. 38 (2021) 834–865, https://doi.org/10.1002/mar.21472.
[187] Z. Zhou, R. Xing, J. Liu, F. Xing, Landmark papers written by the Nobelists in physics from 1901 to 2012: a bibliometric analysis of their citations and journals, Scientometrics 100 (2014) 329–338, https://doi.org/10.1007/s11192-014-1306-7.
[188] J.P. Kamdem, A.E. Duarte, K.R.R. Lima, J.B.T. Rocha, W. Hassan, L.M. Barros, T. Roeder, A. Tsopmo, Research trends in food chemistry: a bibliometric review of its 40 years anniversary (1976–2016), Food Chem. 294 (2019) 448–457, https://doi.org/10.1016/j.foodchem.2019.05.021.
[189] B. Derudder, X. Liu, S. Hong, S. Ruan, Y. Wang, F. Witlox, The shifting position of the journal of transport geography in 'transport geography research': a bibliometric analysis, J. Transp. Geogr. 81 (2019) 102538, https://doi.org/10.1016/j.jtrangeo.2019.102538.
[190] H. Liao, M. Tang, Z. Li, B. Lev, Bibliometric analysis for highly cited papers in operations research and management science from 2008 to 2017 based on essential science indicators, Omega (United Kingdom) 88 (2019) 223–236, https://doi.org/10.1016/j.omega.2018.11.005.
[191] S. Kaffash, A.T. Nguyen, J. Zhu, Big data algorithms and applications in intelligent transportation system: a review and bibliometric analysis, Int. J. Prod. Econ. 231 (2021) 107868, https://doi.org/10.1016/j.ijpe.2020.107868.
[192] H. Liao, F. Liu, Y. Xiao, Z. Wu, E. Kazimieras Zavadskas, A survey on Z-number-based decision analysis methods and applications: what's going on and how to go further? Inform. Sci. (N Y) 663 (2024) 120234 https://doi.org/10.1016/j.ins.2024.120234.
[193] J. Mingers, L. Yang, Evaluating journal quality: a review of journal citation indicators and ranking in business and management, Eur. J. Oper. Res. 257 (2017) 323–337, https://doi.org/10.1016/j.ejor.2016.07.058.
[194] Y. Ding, R. Rousseau, D. Wolfram, Measuring Scholarly Impact: Methods and Practice, Springer, Switzerland, 2014.
[195] L. Waltman, A review of the literature on citation impact indicators, J. Inf. Secur. 10 (2016) 365–391, https://doi.org/10.1016/j.joi.2016.02.007.
[196] D. Hicks, P. Wouters, L. Waltman, S. De Rijcke, I. Rafols, Bibliometrics: the Leiden Manifesto for research metrics, Nature 520 (2015) 429–431, https://doi.org/10.1038/520429a.
[197] W. Glänzel, H.F. Moed, U. Schmoch, M. Thelwall, Springer Handbook Science and Technology indicators, Springer, Switzerland, 2019.
[198] J.E. Hirsch, An index to quantify an individual's scientific research output, Proc. Natl. Acad. Sci. USA 102 (2005) 16569–16572, https://doi.org/10.1073/pnas.0507655102.
[199] E. Garfield, The history and meaning of the journal impact factor, JAMA 295 (2006) 90–93, https://doi.org/10.1001/jama.295.1.90.
[200] E. Garfield, I.H. Sher, New factors in the evaluation of scientific literature through citation indexing, Am. Doc. 14 (1963) 195–201, https://doi.org/10.1002/asi.5090140304.
[201] L. Egghe, Theory and practise of the g-index, Scientometrics 69 (2006) 131–152, https://doi.org/10.1007/s11192-006-0144-7.
[202] S. Alonso, F.J. Cabrerizo, E. Herrera-Viedma, F. Herrera, h-Index: a review focused in its variants, computation and standardization for different scientific fields, J. Inf. Secur. 3 (2009) 273–289, https://doi.org/10.1016/j.joi.2009.04.001.
[203] S. Alonso, F.J. Cabrerizo, E. Herrera-Viedma, F. Herrera, hg-index: a new index to characterize the scientific output of researchers based on the h- and g-indices, Scientometrics 82 (2010) 391–400, https://doi.org/10.1007/s11192-009-0047-5.
[204] M.A. Martínez, M. Herrera, J. López-Gijón, E. Herrera-Viedma, H-classics: characterizing the concept of citation classics through H-index, Scientometrics 98 (2014) 1971–1983, https://doi.org/10.1007/s11192-013-1155-9.
[205] S.J. Bensman, Garfield and the impact factor, Annu. Rev. Inf. Sci. Technol. 41 (2007) 93–155, https://doi.org/10.1002/aris.2007.1440410110.
[206] W. Glänzel, H.F. Moed, Journal impact measures in bibliometric research, Scientometrics 53 (2002) 171–193, https://doi.org/10.1023/A:1014848323806.
[207] J.K. Vanclay, Impact factor: outdated artefact or stepping-stone to journal certification? Scientometrics 92 (2012) 211–238, https://doi.org/10.1007/s11192-011-0561-0.
[208] H.I. Okagbue, J.A. Teixeira da Silva, Correlation between the CiteScore and journal impact factor of top-ranked library and information science journals, Scientometrics 124 (2020) 797–801, https://doi.org/10.1007/s11192-020-03457-x.
[209] N.M. Modak, J.M. Merigó, R. Weber, F. Manzor, J. de D. Ortúzar, Fifty years of transportation research journals: a bibliometric overview, Transp. Res. Part A Policy Pract. 120 (2019) 188–223, https://doi.org/10.1016/j.tra.2018.11.015.
[210] M.J. Cobo, A.G. López-Herrera, E. Herrera-Viedma, F. Herrera, Science mapping software tools: review, analysis, and cooperative study among tools, J. Am. Soc. Inf. Sci. Technol. 62 (2011) 1382–1402, https://doi.org/10.1002/asi.21525.
[211] L. Waltman, N.J. van Eck, E.C.M. Noyons, A unified approach to mapping and clustering of bibliometric networks, J. Inf. Secur. 4 (2010) 629–635, https://doi.org/10.1016/j.joi.2010.07.002.
[212] N.J. van Eck, L. Waltman, Citation-based clustering of publications using CitNetExplorer and VOSviewer, Scientometrics 111 (2017) 1053–1070, https://doi.org/10.1007/s11192-017-2300-7.
[213] N.J. van Eck, L. Waltman, CitNetExplorer: a new software tool for analyzing and visualizing citation networks, J. Inf. Secur. 8 (2014) 802–823, https://doi.org/10.1016/j.joi.2014.07.006.
[214] O. Persson, R. Danell, J.W. Schneider, How to use Bibexcel for various types of bibliometric analysis, in: F. Åström, R. Danell, B. Larsen, J.W. Schneider (Eds.), Celebrating Scholarly Communication Studies: A Festschrift for Olle Persson at His 60th Birthday, International Society for Scientometrics and Informetrics, 2009, pp. 9–24.
[215] M.J. Cobo, A.G. López-Herrera, E. Herrera-Viedma, F. Herrera, SciMAT: a new science mapping analysis software tool, J. Am. Soc. Inf. Sci. Technol. 63 (2012) 1609–1630, https://doi.org/10.1002/asi.22688.
[216] Sci2 Team, Science of Science (Sci2) Tool. https://sci2.cns.iu.edu, 2009.
[217] M. Aria, C. Cuccurullo, bibliometrix: an R-tool for comprehensive science mapping analysis, J. Inf. Secur. 11 (2017) 959–975, https://doi.org/10.1016/j.joi.2017.08.007.
[218] C. Chen, CiteSpace II: detecting and visualizing emerging trends and transient patterns in scientific literature, J. Am. Soc. Inf. Sci. Technol. 57 (2006) 359–377, https://doi.org/10.1002/asi.20317.
[219] S.P. Borgatti, M.G. Everett, L.C. Freeman, UCINET 6 For Windows: Software for Social Network Analysis, Analytic Technologies, Analytic Technologies, Harvard, MA, 2002.
[220] M. Bastian, S. Heymann, M. Jacomy, Gephi: An open source software for exploring and manipulating networks, in: Proceedings of the 3rd International AAAI Conference on Weblogs and Social Media, 2009, pp. 361–362, https://doi.org/10.1609/icwsm.v3i1.13937.
[221] I. Zupic, T. Čater, Bibliometric methods in management and organization, Organ. Res. Methods 18 (2015) 429–472, https://doi.org/10.1177/1094428114562629.
[222] J. Paul, W.M. Lim, A. O'Cass, A.W. Hao, S. Bresciani, Scientific procedures and rationales for systematic literature reviews (SPAR-4-SLR), Int. J. Consum. Stud. 45 (2021) O1–O16, https://doi.org/10.1111/ijcs.12695.

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