https://doi.org/10.1016/j.ejor.2017.04.027

Forty years of the European Journal of Operational Research: A bibliometric overview

Sigifredo Laengle[1], José M. Merigó[1], Jaime Miranda[1], Roman Słowiński[2*], Immanuel Bomze[3], Emanuele Borgonovo[4], Robert G. Dyson[5], Jose Fernando Oliveira[6], Ruud Teunter[7]

[1]*Department of Management Control and Information Systems, School of Economics and Business, University of Chile, Av. Diagonal Paraguay 257, 8330015 Santiago, Chile*

[2]*Institute of Computing Science, Poznań University of Technology, Piotrowo 2, 60-965 Poznań, Poland*

[3]*Department of Statistics and Operations Research, University of Vienna, 1010 Wien, Austria*

[4]*Department of Decision Sciences, Università Bocconi, Via Roentgen 1, 20139 Milano, Italy*

[5]*Warwick Business School, University of Warwick, CV4 7AL, Coventry, UK*

[6]*INESC TEC, Faculty of Engineering University of Porto, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal*

[7]*University of Groningen, PO Box 800, 9700AV Groningen, Netherlands*

E-mails: slaengle@fen.uchile.cl; jmerigo@fen.uchile.cl; jmirandap@fen.uchile.cl; roman.slowinski@cs.put.poznan.pl; immanuel.bomze@univie.ac.at; emanuele.borgonovo@unibocconi.it; Robert.Dyson@wbs.ac.uk; jfo@fe.up.pt; r.h.teunter@rug.nl

Abstract

The European Journal of Operational Research (EJOR) published its first issue in 1977. This paper presents a general overview of the journal over its lifetime by using bibliometric indicators. We discuss its performance compared to other journals in the field and identify key contributing countries/ institutions/ authors as well as trends in research topics based on the Web of Science Core Collection database. The results indicate that EJOR is one of the leading journals in the area of operational research (OR) and management science (MS), with a wide range of authors from institutions and countries from all over the world publishing in it. Graphical visualization of similarities (VOS) provides further insights into how EJOR links to other journals and how it links researchers across the globe.

Keywords: Operational Research, Management Science, Bibliometrics; Web of Science; Citation analysis; VOS viewer.

* Corresponding author

Highlights:

- We present a general overview of the journal over its lifetime by using bibliometric indicators.
- The data come from the Web of Science Core Collection database.
- We identify key contributing countries, institutions, authors, as well as trends in research topics.
- The analysis involves a graphical visualization of similarities by the VOS software.
- EJOR emerges as one of the leading journals in the area of operational research and management science.

1. Introduction

The European Journal of Operational Research (EJOR) was launched in 1977 as the flagship journal of the Association of European Operational Research Societies (EURO) that was created in 1975 (Brans, 1995; Zimmermann, 1995). The idea of creating the journal originated at the first Council Meeting of EURO held on 30th January 1975 (https://www.euro-online.org/web/pages/1516/history-of-ejor). To assess viability of such a journal, a committee consisting of Germain Kreweras, Bernard Roy, Bernhard Tilanus and Hans-Jürgen Zimmermann was appointed. Following their positive recommendation, the Council decided to launch the journal on 8 May 1975. The first editorial team of the journal was formed by Alan Mercer, Bernhard Tilanus and Hans-Jürgen Zimmermann, who remained in charge as co-editors until 1999. Since then, the journal has grown significantly, becoming in the mid-nineties the largest operational research (OR) journal worldwide (Speranza, 2012). In 1999, a new leading editorial team composed of Roman Słowiński, Jacques Teghem and Jyrki Wallenius, took over. Jesús Artalejo, Lorenzo Peccati and Jean-Charles Billaut also served terms as co-editors in this millennium. To deal with an increasing number of submissions on a variety of topics, the number of editors was increased to six over the past decade and the current editors are: Robert Dyson, Immanuel Bomze, Emanuele Borgonovo, José Fernando Oliveira, Ruud Teunter and Roman Słowiński, with the latter acting as the coordinating editor since 2006 (https://www.euro-online.org/web/pages/1516/history-of-ejor).

Contrasting with many other OR journals, the journal has never had a departmental structure, partly to be more open to innovative papers that cross the traditional subfields of OR (https://www.euro-online.org/web/pages/1516/history-of-ejor). Currently, the journal receives more than 3,377 submissions per year and has an acceptance rate around 19%. Its policy is to ask for a revision if there is a potentially important contribution, even if it takes multiple rounds of major revisions to get a paper in an acceptable

form. The number of reviewers and reviews per accepted paper are 2.4 and 4.6, respectively. Moreover, almost always, the reviewing process leading to acceptance goes through at least one major revision (Słowiński, 2016). The journal publishes 24 issues per year divided in eight volumes producing around 8,400 pages with the international publisher Elsevier. The journal is indexed in the Journal Citation Reports (JCR) of the Web of Science (WoS) Core Collection database.

In 2017, EJOR celebrates its 40th anniversary. This paper presents a general bibliometric overview of the journal between 1977 and 2016. We identify and visualize leading trends that have affected the journal during this time. In order to do so, this study analyzes a wide range of bibliometric issues, including publication and citation evolution of the journal, the most productive and influential authors, institutions and countries, the most cited papers and a keyword analysis. Additionally, the work develops a graphical visualization of the bibliographic material published in EJOR by using visualization of similarities (VOS) viewer software (Van Eck and Waltman, 2010). This mapping analysis is carried out with bibliographic coupling (Kessler, 1963), co-occurrence and co-citation analysis (Small, 1973). Note that EJOR published a special anniversary issue for celebrating the first thirty years of EURO with some classical papers published in the journal, but a bibliometric overview of the journal was not given at that time (Mercer et al. 2005).

The rest of the article is structured as follows. Section 2 briefly reviews the bibliometric methodology to be used throughout the paper. Section 3 presents the results of the bibliometric analysis including the publication and citation structure, the leading authors, institutions and countries, the most cited papers and the citing articles. Finally, Section 4 summarizes the main findings.

2. Bibliometric methods

Bibliometrics is the research field that studies the bibliographic material quantitatively (Pritchard, 1969; Broadus, 1987), providing general overviews of a set of documents. This study uses a wide range of bibliometric indicators including the total number of publications and citations, the *h*-index (Hirsch, 2005; Alonso et al. 2009; Franceschini and Maisano, 2010), the cites per paper, citation thresholds and some other related indicators (Merigó et al. 2015a; 2015b). By doing so, the objective is to provide a general informative overview of the bibliographic material (Bonilla et al. 2015; Ding et al. 2014; Mingers and Leydesdorff, 2015). However, the rankings may be different depending on the specific indicator considered, so each reader can interpret the results according to her or his interests (Coupé, 2003; Podsakoff et al. 2008, Hsieh and Chang, 2009).

The article uses the WoS Core Collection database in the search process of the information. We remark that there are other databases for dealing with academic documents (Mongeon and Paul-Hus, 2016). Note that WoS is owned by the company Thomson & Reuters Corporation. The search was carried out between June 2016 and March 2017 and considers all the documents published in the journal since its origin in 1977. The documents from the year 1977 are not directly available in the database. In order to solve this problem, the Cited Reference Search of the WoS Core Collection is used in order to identify all the documents published in 1977 that have received at least one citation. For those documents published in 1977 that have not received any citations, the study tracked them in the webpage of the journal. The search resulted in 16,576 documents published in EJOR until 31 December 2016. This number reduces to 14,617 if only considering articles, reviews, and short communications. Up to 2016, the journal has received 329,739 citations and has 22.6 cites per paper. The *h*-index of 185 indicates that of the set of 14,617 documents, 185 have received 185 citations or more.

The study focuses on the bibliometric analysis of a specific journal. This type of methodology has already been used in previous studies for other journals, including the Journal of Business Research (Merigó et al. 2015b), Knowledge-Based Systems (Cobo et al. 2015), the Journal of Business & Industrial Marketing (Valenzuela et al. 2017), and the International Journal of Intelligent Systems (Merigó et al. 2017). The methodology focuses on the documents published by the journal and analyzes various issues, including the publication and citation structure, temporal evolution, authors, universities, countries and keywords.

In order to map the bibliographic material, we use the VOS viewer software (Van Eck and Waltman, 2010). This software visualizes the results through a wide range of bibliometric indicators including bibliographic coupling, co-citation and co-occurrence (Merigó et al. 2016). Bibliographic coupling (Kessler, 1963) occurs when two documents cite the same third document. Co-citation (Small, 1973) appears when two documents receive a citation from the same third document. Co-occurrence analyzes the most common keywords used in the documents. Observe that in this paper the focus of co-occurrence is on the keyword list of the articles provided usually at the first page of the paper. The graphical visualization is carried out through a network representation, where the size of a circle increases with an item's relevance and the network connections identify more closely linked items. The place of the circles and the colors are used to cluster the items. Note that the VOS viewer is freely available and further information can be found at: http://www.vosviewer.com/.

3. Results

This section presents the results of the paper. The work analyzes the publication and citation structure of EJOR and the most productive and influential authors, institutions and countries of the journal.

3.1. Publication and citation structure of EJOR

EJOR started publishing articles in 1977. The journal grew very quickly and by the end of the eighties, it was publishing around two hundred papers per year. In the nineties, the number grew up to four hundred papers per year. In the beginning of the millennium, the journal reached a top of 820 articles per year. During the last years, the number of articles published has decreased, and currently is around 650 papers per year. Figure 1 visualizes the annual number of articles published in the journal.

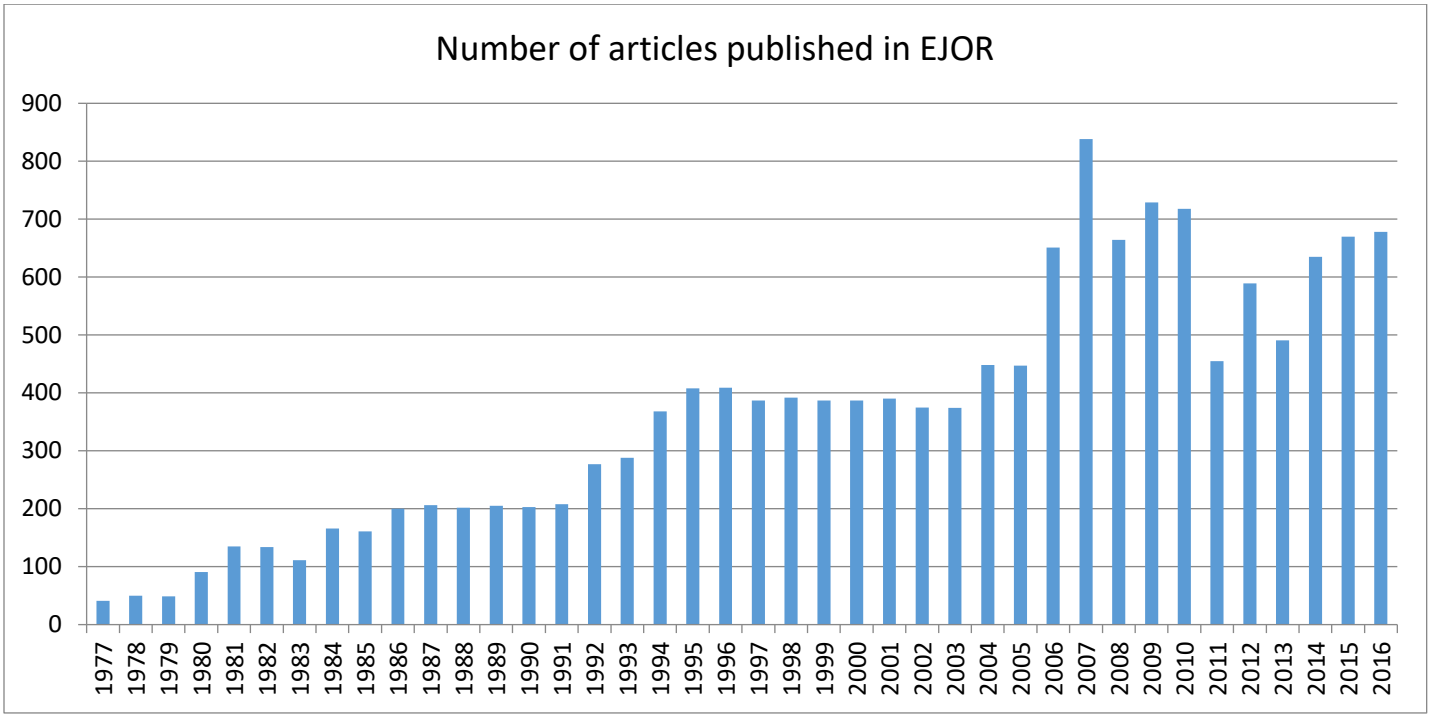

Figure 1. Annual number of articles published in EJOR

The number of submissions to the journal per year is, however, a better measure of its growing popularity (Słowiński, 2016). This is shown in Table 1, together with the number of full text downloads of EJOR articles from ScienceDirect. One can note that the number of submissions increased almost six times since 1999, attaining 3,377 in 2016. The number of full text downloads of EJOR articles represents

the magnitude of the EJOR readership. In the beginning of 2000's, the number of printed copies of EJOR was around 800. After passing to the electronic platform, the number of full text downloads grew dramatically, attaining in 2016 almost 3 million articles. This shows not only the growing popularity of EJOR, but also a real revolution in the readership due to the electronic access to EJOR.

Table 1. Number of submissions to EJOR, and number of full text downloads of EJOR articles from ScienceDirect

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007
#submissions	688	652	784	804	950	1,054	1,106	1,550	1,890
#downloads	-	-	131,616	166,624	437,115	590,067	734,798	840,813	1,340,547
Year	2008	2009	2010	2011	2012	2013	2014	2015	2016
#submissions	1,943	1,923	2,242	2,571	2,781	2,894	3,014	3,177	3,377
#downloads	1,853,702	2,353,944	1,939,786	1,765,431	1,954,406	2,229,388	2,452,224	2,789,573	2,844,540

EJOR strives to cover the entire OR spectrum, which is evolving over time. This is one of the reasons why it does not have a departmental structure, but instead uses a periodically reviewed long list of keywords from which one should be picked as the leading one for any submission (also to aid a proper assignment to one of the editors). Figures 2 and 3 show the most frequently used keywords and their relations over the entire lifetime and the most recent years, respectively. In Table A.1 of the appendix, we also present the related top-30 keyword list both over the complete journal lifetime and over shorter time windows. Note that the co-occurrence number indicates the number of times the keyword appeared together with other leading keywords with at least thirty occurrences.

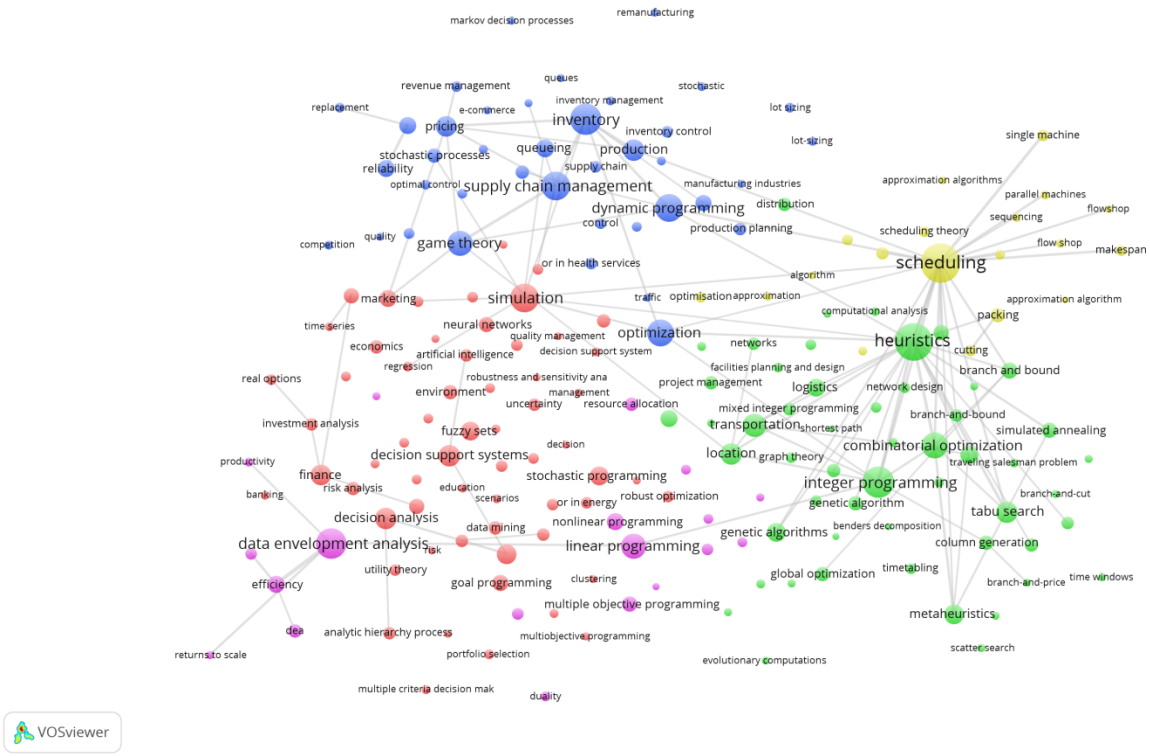

Figure 2. Co-occurrence of author keywords of documents published in EJOR, 1977-2016

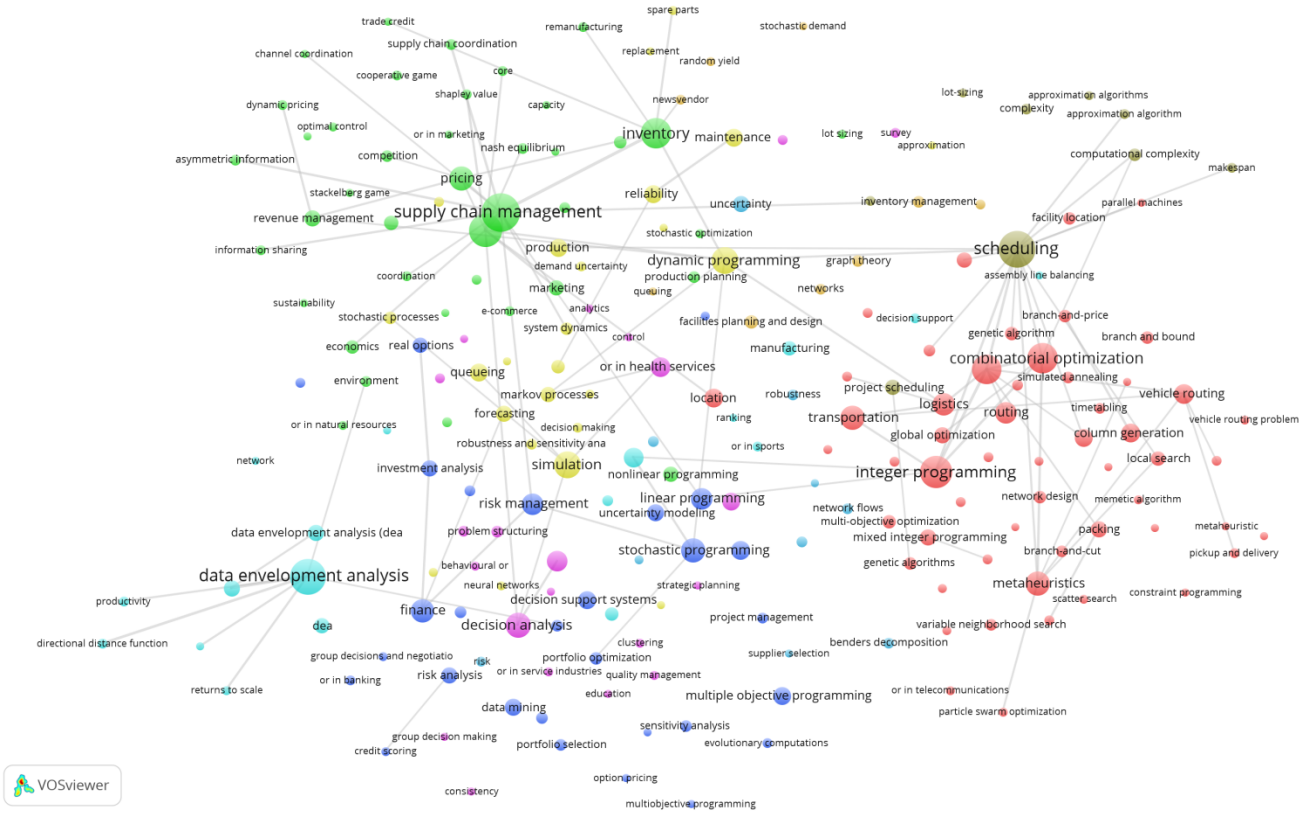

Figure 3. Co-occurrence of author keywords of documents published in EJOR: 2010-2016

It appears from Figures 2 and 3 (and Table A.1 in the appendix) that many of the key topics over the entire lifetime of the journal, such as scheduling, data envelopment analysis, integer programming, inventory, heuristics, combinatorial optimization, transportation, finance, dynamic programming and game theory, are still active research areas. There are some noteworthy developments though. Tabu search has been overtaken by metaheuristics in recent years, and stochastic programming now receives more attention than linear programming. Robust optimization and multiple objective programming outrank optimization that was at the top of the ranking in the 90's. Multiple criteria analysis and game theory climbed in the ranking significantly. Vehicle routing, simulation and supply chain management are also growing in importance, with the latter even taking the top spot since 2010.

Next, let us look into the annual citation structure of EJOR. For doing so, the work considers several specific citation thresholds to identify the number of articles published in a certain year that have exceeded them. Table 2 presents the results.

Table 2. Annual citation structure of EJOR

Year	≥200	≥100	≥50	≥10	≥1	TP	TC	*h*
1977	1	1	3	11	38	41	751	10
1978	1	1	1	16	42	50	7,365	12
1979	1	1	2	12	39	49	674	11
1980	0	2	5	38	77	91	1,323	20
1981	1	2	11	41	121	135	1,800	22
1982	2	5	11	50	117	134	2,411	23
1983	1	7	13	43	89	111	2,257	24
1984	1	3	12	64	146	166	2,748	25
1985	1	2	10	60	142	161	2,446	27
1986	1	6	20	97	178	200	4,389	34
1987	3	7	22	76	178	206	3,999	32
1988	2	5	15	87	180	202	3,649	31
1989	2	12	29	98	178	205	5,013	39
1990	7	12	30	113	189	203	7,607	39
1991	4	12	21	83	183	208	4,851	32
1992	3	9	32	143	255	277	6,451	41
1993	2	11	33	141	263	288	6,849	43
1994	5	9	28	145	333	368	6,522	41
1995	2	15	55	221	384	408	9,703	52
1996	8	26	59	244	396	409	13,081	54
1997	7	20	67	236	374	387	12,343	57
1998	7	21	73	243	379	392	11,791	59
1999	6	31	75	254	378	387	13,469	58
2000	5	29	76	257	376	387	13,208	59
2001	10	28	73	263	380	390	14,355	59
2002	13	30	74	247	362	375	13,546	60
2003	8	28	87	276	364	374	13,440	61
2004	8	23	79	320	434	448	15,483	60
2005	10	23	65	276	435	447	12,750	54
2006	7	25	86	434	637	651	18,124	59
2007	10	32	107	554	816	838	23,043	65
2008	7	23	80	410	645	664	16,583	60
2009	3	13	69	449	712	729	15,801	54
2010	5	14	54	437	704	718	14,298	51
2011	1	2	14	236	440	455	6,677	35
2012	0	2	16	285	569	589	7,765	36
2013	0	2	11	162	472	491	4,941	29
2014	0	1	8	154	590	635	4,890	25
2015	0	1	1	60	570	670	2,575	16
2016	0	0	0	5	330	678	768	9
Total	155	497	1,529	7,343	13,495	14,617	329,739	185
%	1.06%	3.39%	10.45%	50.22%	92.32%	100%		

Abbreviations: TP = Total publications; TC = Total citations; *h* = *h*-index; % = Percentage of publications.

It appears from Table 2 that the journal has been able to maintain a good quality over its entire lifetime, publishing many papers that have since been highly cited. Obviously, the contributions from the last few years still need some time to catch up, however, the fact that most of the highly cited papers have been published in the nineties and up to 2008, indicates that the quality has improved over time. Note that 3.39% of the papers have received one hundred citations or more. Around 50% of the papers received at least ten citations, and 92% at least have received one citation. In total, the journal has received a third of million citations since its creation, considering documents indexed in the WoS database.

Table 3. The 50 most cited articles in EJOR according to WoS

R	TC	Title	Author/s	Year	C/Y
1	6,973	Measuring Efficiency of Decision-Making Units	Charnes, A; Cooper, WW; Rhodes, E	1978	183.50
2	1,497	How to Make a Decision - The Analytic Hierarchy Process	Saaty, TL	1990	57.58
3	933	Applications of the Extent Analysis Method on Fuzzy AHP	Chang, DY	1996	46.65
4	821	Benchmarks for Basic Scheduling Problems	Taillard, E	1993	35.70
5	765	Variable Neighborhood Search: Principles and Applications	Hansen, P; Mladenovic, N	2001	51.00
6	750	Compromise Sol. by MCDM Methods: A Comp. An. of VIKOR and TOPSIS	Opricovic, S; Tzeng, GH	2004	62.50
7	739	Quantitative Models for Reverse Logistics: A Review	Fleischmann, M; Bloemhofruwaard, JM; Dekker, R; et al.	1997	38.89
8	730	Efficiency of Fin. Inst.: int. Survey and Directions for Future Research	Berger, AN; Humphrey, DB	1997	38.42
9	695	Vendor Selection Criteria and Methods	Weber, CA; Current, JR; Benton, WC	1991	27.80
10	643	Rough Sets Theory for Multi-Criteria Decision Analysis	Greco, S; Matarazzo, B; Słowiński, R	2001	42.87
11	634	How to Select and How to Rank Projects - The PROMETHEE Method	Brans, JP; Vincke, P; Mareschal, B	1986	21.13
12	632	Analytic Hierarchy Process: An Overview of Applications	Vaidya, OS; Kumar, S	2006	63.20
13	628	Resource-Constrained Project Scheduling: Notation, Classification, Models, and Methods	Brucker, P; Drexl, A; Mohring, R; Neumann, K; Pesch, E	1999	36.94
14	599	A Survey of Maintenance Policies of Deteriorating Systems	Wang, HZ	2002	42.79
15	583	A Slacks-Based Measure of Efficiency in Data Envelopment Analysis	Tone, K	2001	38.87
16	571	An Effective Implementation of the Lin-Kernighan Trav. Salesman Heuristic	Helsgaun, K	2000	35.69
17	508	Coordinated Supply Chain Management	Thomas, DJ; Griffin, PM	1996	25.40
18	502	The Vehicle-Routing Problem - An Overview of Exact and Approximate Algorithms	Laporte, G	1992	20.92
19	500	A Survey of Scheduling Problems with Setup Times or Costs	Allahverdi, A; NG, CT; Cheng, TCE; Kovalyov, MY	2008	62.50
20	467	Facility Location and Supply Chain Management - A Review	Melo, MT; Nickel, S; Saldanha-Da-Gama, F	2009	66.71
21	449	Scheduling with Batching: A Review	Potts, CN; Kovalyov, MY	2000	28.06
22	442	MCDM Approaches for Supplier Evaluation and Selection: A Lit. Review	Ho, W; Xu, XW; Dey, PK	2010	73.67
23	439	A Typology of Cutting and Packing Problems	Dyckhoff, H	1990	16.88
24	427	SMS-EMOA: Multiobjective Selection Based on Dominated Hypervolume	Beume, N; Naujoks, B; Emmerich, M	2007	47.44
25	419	An Improved Typology of Cutting and Packing Problems	Wascher, G; Haubner, H; Schumann, H	2007	46.56
26	412	Recent Trends in Modeling of Deteriorating Inventory	Goyal, SK; Giri, BC	2001	27.47
27	402	Some Issues on Consistency of Fuzzy Preference Relations	Herrera-Viedma, E; Herrera, F; Chiclana, F; Luque, M	2004	33.50
28	394	A Concise Survey of Scheduling with Time-Dependent Processing Times	Cheng, TCE; Ding, Q; Lin, BMT	2004	32.83
29	389	Some Efficient Heuristic Methods for the Flow-Shop Sequencing Problem	Taillard, E	1990	14.96
30	387	Strategic Facility Location: A Review	Owen, SH; Daskin, MS	1998	21.50
31	373	ERP: Implementation Procedures and Critical Success Factors	Umble, EJ; Haft, RR; Umble, MM	2003	28.69
32	369	A Colony Optimization for Continuous Domains	Socha, K; Dorigo, M	2008	46.13
33	379	Assessing a Set of Additive Utility-Functions for MCDM, the UTA Method	Jacquet-Lagrèze, E; Siskos, J	1982	11.15
34	365	Imperfect Maintenance	Pham, H; Wang, HZ	1996	18.25
35	362	Data Envelopment Analysis (DEA) - Thirty Years on	Cook, WD; Seiford, LM	2009	51.71
36	361	The Application of Fuzzy Integrals in Multicriteria Decision Making	Grabisch, M	1996	18.05
37	360	Single-Machine Scheduling with Learning Considerations	Biskup, D	1999	21.18
38	354	Staff Sched. and Rostering: A Review of Appl., Methods and Models	Ernst, AT; Jiang, H; Krishnamoorthy, M; Sier, D	2004	29.50
39	354	Serial and Parallel Resource-Constrained Project Scheduling Methods Revisited: Theory and Computation	Kolisch, R	1996	17.70
40	350	Simulated Annealing - A Tool for Operational Research	Eglese, RW	1990	13.46
41	350	Estimating Most Productive Scale Size Using Data Envelopment Analysis	Banker, RD	1984	10.94
42	349	A Survey on Problems and Methods in Generalized Assembly Line Balancing	Becker, C; Scholl, A	2006	34.90
43	343	A Quadratic Integer-Program for the Location of Interacting Hub Facilities	Okelly, ME	1987	11.83
44	339	A Stochastic Programming Approach for SC Network Design Under Uncertainty	Santoso, T; Ahmed, S; Goetschalckx, M; Shapiro, A	2005	30.82
45	338	A State of the Art Review on Scheduling with Learning Effects	Biskup, D	2008	42.25
46	336	Modeling Undesirable Factors in Efficiency Evaluation	Seiford, LM; Zhu, J	2002	24.00
47	331	A Survey of Data Envelopment Analysis in Energy and Environmental Studies	Zhou, P; Ang, BW; Poh, KL	2008	41.38
48	326	Deterministic Job-Shop Scheduling: Past, Present and Future	Jain, AS; Meeran, S	1999	19.18
49	324	Survey of Scheduling Research Involving Due Date Determination Decisions	Cheng, TCE; Gupta, MC	1989	12.00
50	320	Managing Non-Homogeneous Information in Group Decision Making	Herrera, F; Martinez, L; Sanchez, PJ	2005	29.09

Abbreviations available in Table 2 except for: R = Rank; C/Y = Citations per year.

The most cited paper was published by Charnes, Cooper and Rhodes and has 6,973 citations (Charnes et al. 1978). It is *the* classical paper on data envelopment analysis, one of the cornerstones of

OR, and is in fact the most cited paper of all time in any OR journal (Merigó and Yang, 2017). The second most cited paper is one of the key papers of Saaty about the analytic hierarchy process, which has also received over one thousand citations. Note that Dirk Biskup, Eric Taillard and Francisco Herrera have two papers each in the list.

Of course, besides the authors listed in Table 3, many others have contributed significantly to EJOR. Table 4 presents the fifty most productive authors in the journal. In order to get a general picture of the results of each author, the table considers several bibliometric indicators for EJOR publications: the number of papers, the number of citations, the *h*-index, and the cites per paper. Please note also that only the last/current affiliation of the corresponding author is listed.

Table 4. The most productive and influential authors in EJOR

				EJOR			
R	Name	Affiliation	Country	TP	TC	TC/TP	*h*
1	Laporte G	HEC Montreal	Canada	70	3221	46.01	29
2	Cheng TCE	Hong Kong Pol U	China	59	2657	45.03	22
3	Zhu J	Worcester Pol Inst	USA	44	2015	45.80	22
4	Gendreau M	Polytech Montreal	Canada	36	1309	36.36	16
5	Lim A	Nat U Singapore	Singapore	35	591	16.89	13
6	Kleijnen JPC	Tilburg U	Netherlands	32	1306	40.81	17
7	Berman O	U Toronto	Canada	31	586	18.90	14
8	Sueyoshi T	New Mexico Tech	USA	30	1132	37.73	22
9	Sakawa M	Hiroshima U	Japan	30	839	27.97	17
10	Goyal SK	Concordia U	Canada	29	1728	59.59	20
11	Słowiński R	Poznań U Tech	Poland	28	2414	86.21	21
12	Glover F	U Colorado	USA	27	1060	39.26	17
13	Escudero LF	U Rey Juan Carlos	Spain	27	379	14.04	11
14	Dekker R	Eras U Rotterdam	Netherlands	26	1877	72.19	18
15	Cook WD	York U	Canada	26	1388	53.38	19
16	Lahdelma R	Aalto U	Finland	26	1069	41.12	19
17	Lau HS	Oklahoma St U	USA	26	724	27.85	15
18	Wang SY	Chinese Acad Sci	China	26	564	21.69	12
19	Drezner Z	California St U	USA	26	442	17.00	14
20	Cooper WW	U Texas Austin	USA	25	8323	332.92	17
21	van Wassenhove LN	INSEAD	France	24	1867	77.79	18
22	Tang CS	UCLA	USA	24	436	18.17	11
23	Puerto J	U Sevilla	Spain	24	287	11.96	9
24	Greco S	U Catania	Italy	23	1822	79.22	16
25	Koulamas C	Florida Int U	USA	23	401	17.43	9
26	Speranza MG	U Brescia	Italy	23	366	15.91	8
27	Kovalyov MY	Nat Ac Sc Belarus	Belarus	22	1353	61.50	12
28	Zopounidis C	Tech U Crete	Greece	22	1042	47.36	15
29	Podinovski VV	Loughborough U	UK	22	546	24.82	11
30	White DJ	U Virginia	USA	22	156	7.09	7
31	Beasley JE	Brunel U London	UK	21	1439	68.52	19
32	Kao C	Nat Cheng Kung U	Taiwan	21	924	44.00	14
33	Crainic TG	U Quebec Montreal	Canada	21	709	33.76	10

34	Lai KK	City U Hong Kong	China	21	510	24.29	12
35	Wallenius J	Aalto U	Finland	21	464	22.10	12
36	Chu CB	Ecole Central Paris	France	20	526	26.30	12
37	Toth P	U Bologna	Italy	20	515	25.75	12
38	Batta R	SUNY Buffalo	USA	20	403	20.15	13
39	Yang JB	U Manchester	UK	19	934	49.16	13
40	Błażewicz J	Poznan U Tech	Poland	19	568	29.89	12
41	Korhonen P	Aalto U	Finland	19	403	21.21	11
42	Gouveia L	U Lisboa	Portugal	19	272	14.32	8
43	Bruneel H	U Gent	Belgium	19	211	11.11	9
44	Kort PM	Tilburg U	Netherlands	19	164	8.63	6
45	Mladenovic N	U Belgrade	Serbia	18	1199	66.61	13
46	Hansen P	HEC Montreal	Canada	18	1148	63.78	10
47	Ng CT	Hong Kong Pol U	China	18	805	44.72	8
48	Boysen N	FS U Jena	Germany	18	647	35.94	11
49	Lee LH	Nat U Singapore	Singapore	18	273	15.17	9
50	Borm P	Tilburg U	Netherlands	18	236	13.11	8

Abbreviations are in Tables 2 and 3 except for: TC/TP = Cites per paper.

Gilbert Laporte is the most productive author of the journal. The country affiliation of the authors is quite diverse and there is no specific country that dominates the list, although several countries have several authors in the list.

3.2. Most productive and influential institutions and countries

Institutions from all over the world have published in EJOR. Figure 4 shows the relative numbers of publications and bibliographic coupling of institutions. Note that the focus is on the institutional affiliation of the authors at the moment of publication of a paper, and that Figure 4 is based on a threshold of forty documents and one hundred connections.

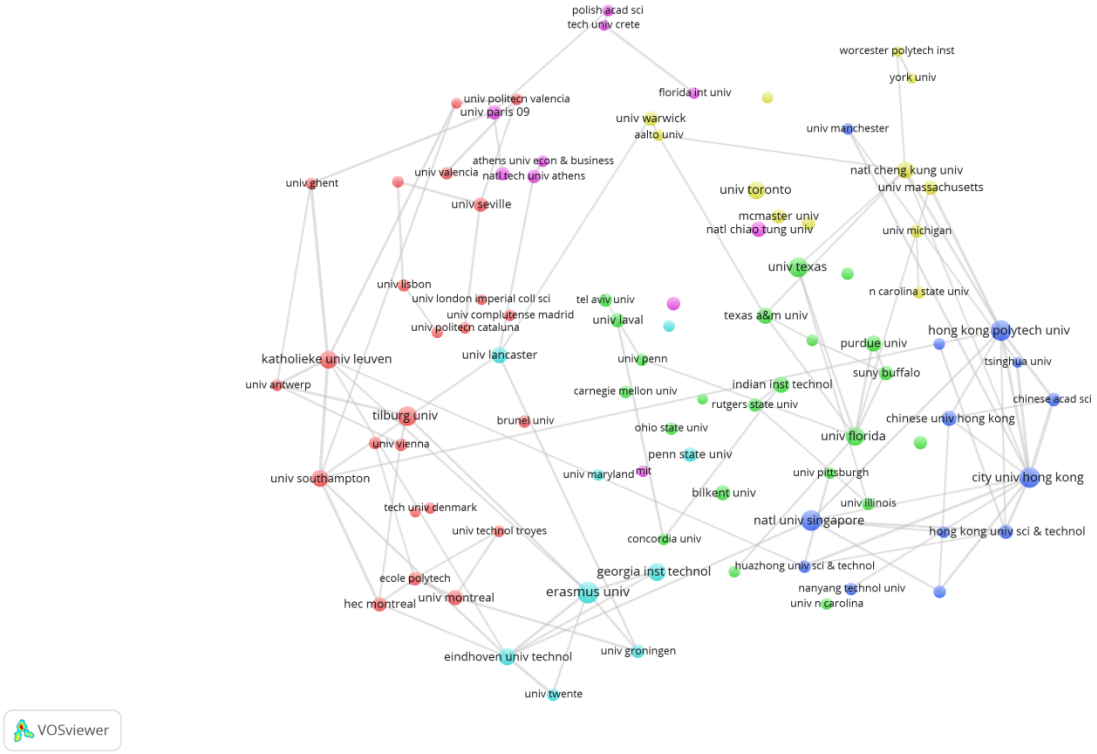

Figure 4. Bibliographic coupling of institutions that publish in EJOR

The University of Montreal is the most productive institution in EJOR, thanks in part to the work of Gilbert Laporte and his colleagues. Figure 4 clearly shows that universities are most closely coupled with institutions in the same or nearby countries. Indeed, most European countries are situated on the left of Figure 4, with North American and Asian countries forming clusters on the bottom and top right, respectively. Figure A.1 in the appendix shows that the same conclusions apply to the co-authorship between institutions.

Next we scale up to the country level. Figure 5 presents the most productive countries by using a bibliographic coupling analysis with a threshold of five documents and one hundred links.

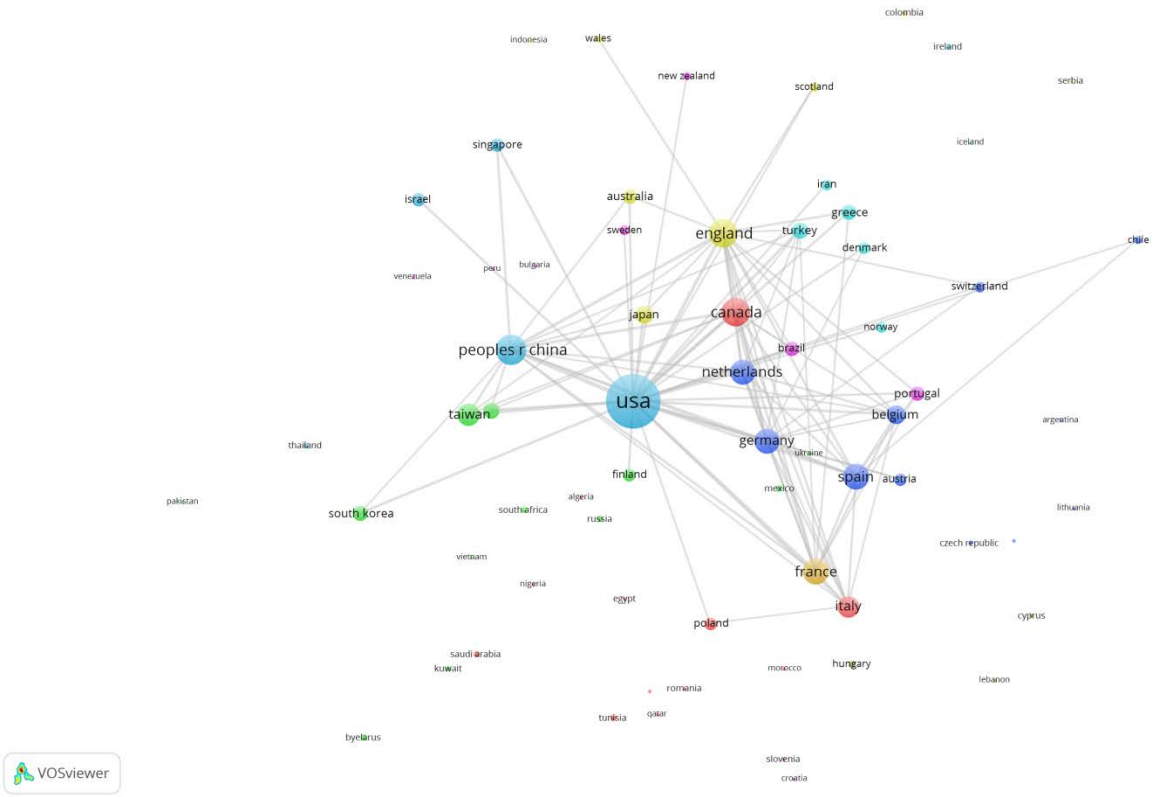

Figure 5. Bibliographic coupling of countries that publish in EJOR

The USA appears as the most productive country, followed by the UK, China and Canada. However, this result may be related to their large populations. Indeed, per capita, a number of European countries publish more. In particular, scientists in The Netherlands, Belgium and Finland contribute significantly to EJOR. Exact numbers are given in Table A.2 of the appendix. While the total of European countries represents the core of the journal as one would expect, EJOR is in fact a truly global journal. Further analysis over time, by producing similar figures for different time periods, reveals as expected that the developing countries are growing in importance. One can also observe a growing ratio of articles written by authors from more than one country – this ratio grew from 18% in 1999 to 39% in 2015 (Słowiński, 2016).

3.3. Related journals and ranking of EJOR

Figure 6 depicts how other journals connect to EJOR, based on a co-citation analysis from publications of EJOR considering a minimum threshold of two hundred citations received and showing the one hundred most representative links.

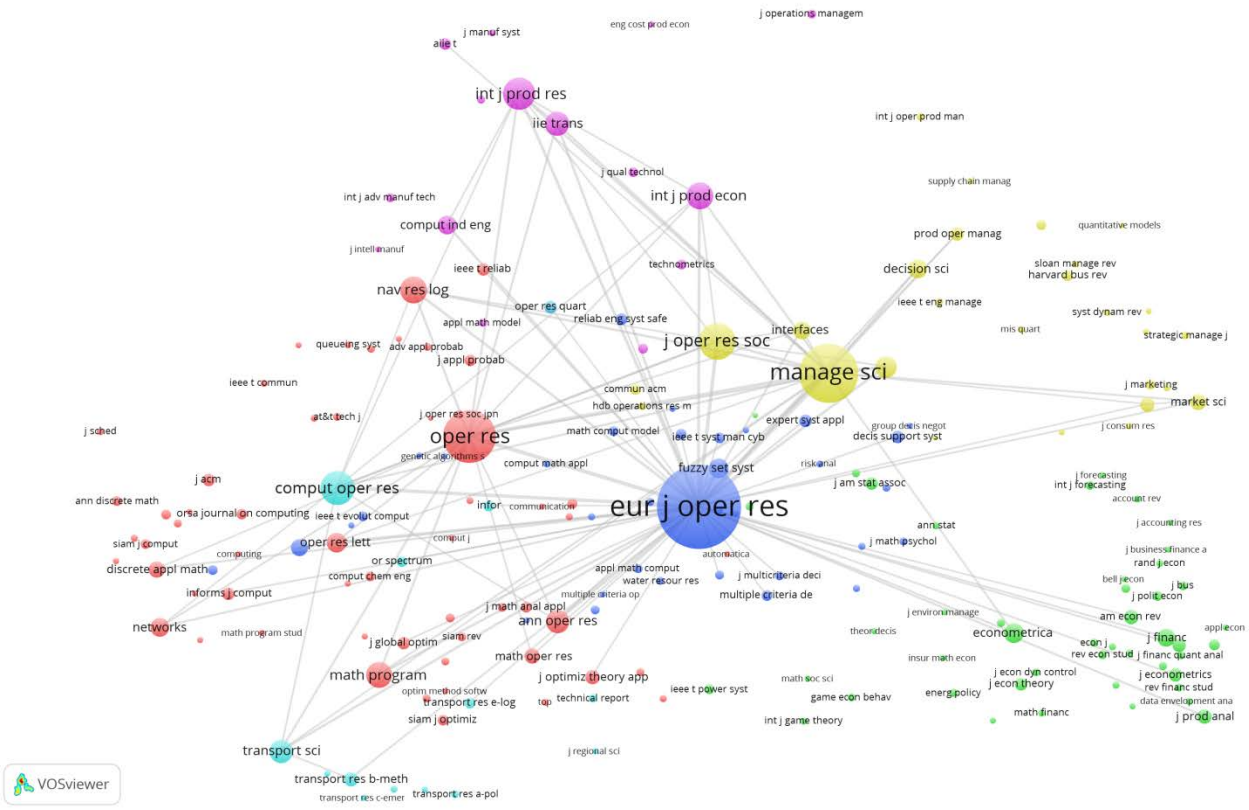

Figure 6. Co-citation of journals cited in EJOR

Given that EJOR is the largest OR journal, it is not surprising that the most cited articles are in other publications from the journal itself. This is in fact a common result even for smaller journals (Merigó et al. 2015), and at 15% the self-citation level of EJOR is below that of many other journals (Słowiński, 2016). The journals Management Science and Operations Research are also very influential. Other journals that play an important role include the Journal of the Operational Research Society, Computers & Operations Research, the International Journal of Production Research, the International Journal of Production Economics, and Naval Research Logistics. Note that Figure 6 confirms EJOR's broad, interdisciplinary profile, citing also journals outside OR from fields such as Economics, Finance,

Management and Marketing. Also remarkable is the strong connection with Computer Science journals such as Information Sciences, Applied Soft Computing, Knowledge Based Systems, Journal of Intelligent Fuzzy Systems, and the IEEE Transactions on Systems, Man and Cybernetics. Tables A.3 and A.4 of the appendix provide additional co-citation results by listing the top-30 related journals and countries up to and after the year 2000, respectively, confirming the findings reported above.

Finally, we analyze the citation performance of EJOR compared to other OR journals. Table 5 presents the twenty journals with the highest *h*-index in the WoS category of Operations Research and Management Science. Note that the results only consider the publications of the journals between 1992 and 2016. For a longer time-window that considers all the documents of the journals available in WoS, see (Merigó and Yang, 2017). Table 5 ranks the journals by the *h*-index, but it also considers several other indicators including the number of papers published, the number of citations received and the impact factor, with the best score for each measure indicated in bold face.

Table 5. Comparison of EJOR with other leading OR journals (1992-2016)

R	Journal	TC	TP	*h*	C/P	>200	>50	>10	IF	IF5	AIS
1	Management Science	164,122	3,390	**178**	48.41	**149**	891	2,306	2.741	3.728	**3.049**
2	European J Operational Research	**278,456**	**12,455**	171	22.36	127	**1,322**	**6,452**	2.679	3.109	1.080
3	J Operations Management	41,870	705	110	**59.39**	38	270	554	**4**	**8.229**	2.375
4	Operations Research	65,789	2,326	108	28.28	23	364	1,395	1.777	2.838	1.993
5	Systems & Control Letters	65,469	3,055	104	21.43	39	296	1,366	1.908	2.448	1.184
6	Expert Systems With Applications	153,647	10,325	101	14.88	15	535	4,717	2.981	2.879	0.658
7	International J Production Economics	100,805	5,383	100	18.73	19	444	2,774	2.782	3.548	0.852
8	Mathematical Programming	58,981	2,265	95	26.04	32	277	1,193	2.062	2.471	2.205
9	Computers & Operations Research	77,654	4,065	92	19.10	17	364	2,070	1.988	2.382	0.899
10	Transportation Research Part B-Method	48,211	1,688	91	28.56	20	279	1,030	3.769	4.833	1.549
11	International J Production Research	94,684	7,244	85	13.07	1	288	3,019	1.693	1.867	0.460
12	Decision Support Systems	50,610	2,578	85	19.63	14	212	1,315	2.604	3.271	0.916
13	Omega – Int J Management Science	40,307	1,677	85	24.04	19	196	931	3.962	4.289	1.215
14	Reliability Engineering & System Safety	61,270	3,644	83	16.81	16	247	1,708	2.498	2.873	0.847
15	Transportation Science	26,958	889	79	30.32	11	169	537	3.295	3.735	1.724
16	J Operational Research Society	50,327	3,629	76	13.87	15	182	1,303	1.225	1.386	0.519
17	Annals of Operations Research	34,923	3,305	71	10.57	7	120	982	1.406	1.616	0.732
18	J Optimization Theory and Applications	42,495	3,813	70	11.14	12	146	1,192	1.16	1.384	0.737
19	J Quality Technology	19,375	785	70	24.68	7	119	407	1.578	2.412	1.300
20	IIE Transactions	34,815	2,125	69	16.38	5	136	1,020	1.463	1.723	0.800

Abbreviations are available in Tables 2 and 4 except for: >200, >50 and >10 = Number of documents with equal or more than 200, 50 and 10 citations; IF = Impact factor; IF5 = 5-year impact factor; AIS = Article influence score.

All performance measures show that EJOR has a significant impact in the scientific community. It has obtained more citations by far than any other journal. Although this is obviously related in part to the size of the journal, EJOR has also published the largest number of highly cited papers and has the

second best *h*-index. Moreover, according to the citations per paper ratio, it stands at the ninth position, which is remarkable given its large size. According to the article influence score it is also a top-10 journal, if only just. These results are in line with those of Merigó and Yang (2017) and explain why EJOR is generally recognized as one of the top journals in the field of OR and Management Science (MS); see Eto (2002); Mingers and Burrell (2006).

4. Conclusions

EJOR is forty years old. To celebrate this anniversary, this paper presents a bibliometric overview of the leading trends that have occurred in the journal during this time, using the WoS Core Collection database to collect bibliographic information and determine a wide range of bibliometric indicators. The work also develops a mapping analysis of the bibliographic material in order to visualize the bibliometric networks seen according to different perspectives, including journals, authors, universities and keywords.

From the results, EJOR emerges as one of the leading journals in the field. As its scope is broad, the ranking of the most popular keywords characterizing the articles published in different periods of time permit to observe the evolution of OR as a field of study during the last 40 years. The journal is at the core of OR and MS, and strongly connected to many other journals, including Management Science, Operations Research, Journal of the Operational Research Society and Computers & Operations Research. It is also strongly connected to other journals in related or more specific fields including the International Journal of Productions Research, the International Journal of Production Economics, Naval Research Logistics, Mathematical Programming, Omega, IIE Transactions, Computers & Industrial Engineering, Information Sciences, Transportation Science, and Econometrica. Also remarkable is the growing number of citations obtained from Computer Science journals such as Information Sciences, Applied Soft Computing, Knowledge Based Systems, Journal of Intelligent & Fuzzy Systems, and Applied Mathematics & Computation. The most cited paper is also the most cited paper of all time in the field of OR and MS and was published by Charnes, Cooper and Rhodes. The journal is very diverse in terms of institutions and countries and is strongly influenced by European countries.

References

Alonso, S., Cabrerizo, F. J., Herrera-Viedma, E., & Herrera, F. (2009). H-index: A review focused on its variants, computation, and standardization for different scientific fields. *Journal of Informetrics*, 3, 273–289.

Bonilla, C., Merigó, J.M., & Torres-Abad, C. (2015). Economics in Latin America: A bibliometric analysis. *Scientometrics*, 105, 1239–1252.

Brans, J. P. (1995). EURO 1975-1995: A fruitful evolution. *European Journal of Operational Research*, 87, 408–414.

Broadus, R. N. (1987). Toward a definition of "Bibliometrics". *Scientometrics*, 12, 373–379.

Charnes, A., Cooper, W. W., & Rhodes, C. E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research*, 2, 429–444.

Cobo, M. J., Martínez, M. A., Gutiérrez-Salcedo, M., Fujita, H., & Herrera-Viedma, E. (2015). 25 years at Knowledge-Based Systems: A bibliometric analysis. *Knowledge-Based Systems*, 80, 3–13.

Coupé, T. (2003). Revealed performances: Worldwide rankings of economists and economics departments, 1990–2000. *Journal of the European Economic Association*, 1, 1309–1345.

Ding, Y., Rousseau, R., & Wolfram, D. (2014). *Measuring scholarly impact: Methods and practice*. Springer International Publishing, Switzerland.

Eto, H. (2002). Authorship and citation patterns in Management Science in comparison with operational research. *Scientometrics*, 53, 337–349.

Franceschini, F., & Maisano, D. A. (2010). Analysis of the Hirsch index's operational properties. *European Journal of Operational Research*, 203, 494–504.

Hirsch, J. E. (2005). An index to quantify an individual's scientific research output. *Proceedings of the National Academy of Sciences of the United States of America*, 102, 16569–16572.

Hsieh, P. N., & Chang, P. L. (2009). An assessment of world-wide research productivity in production and operations management. *International Journal of Production Economics*, 120, 540–551.

Kessler, M. M. (1963). Bibliographic coupling between scientific papers. *American Documentation*, 14, 10–25.

Mercer, A., Peccati, L., Słowiński, R., Teghem, J., Tilanus, B., Wallenius, J., & Zimmermann, H. J. (2005). A collection of 30 influential articles published in EJOR celebrating the 30th anniversary of EURO. Available at: www.elsevier.com/authored_subject_ sections/S03/Anniversary/30th_anniversary.htm.

Merigó, J. M., Blanco-Mesa, F., Gil-Lafuente, A. M., & Yager, R. R. (2017). Thirty years of the International Journal of Intelligent Systems: A bibliometric review, *International Journal of Intelligent Systems*, 32, 526–554.

Merigó, J. M., Cancino, C., Coronado, F., & Urbano, D. (2016). Academic research in innovation: A country analysis. *Scientometrics*, 108, 559–593.

Merigó, J. M., Gil-Lafuente, A. M., & Yager, R. R. (2015a). An overview of fuzzy research with bibliometric indicators. *Applied Soft Computing*, 27, 420–433.

Merigó, J.M., Mas-Tur, A., Roig-Tierno, N., & Ribeiro-Soriano, D. (2015b). A bibliometric overview of the Journal of Business Research between 1973 and 2014. *Journal of Business Research*, 68, 2645–2653.

Merigó, J. M., & Yang, J. B. (2017). A bibliometric overview of operations research & management science. *Omega – International Journal of Management Science*, http://dx.doi.org/10.1016/j.omega.2016.12.004.

Mingers, J., & Burrell, Q. L. (2006). Modeling citation behavior in Management Science journals. *Information Processing and Management*, 42, 1451–1464.

Mingers, J., & Leydesdorff, L. (2015). A review of theory and practice of scientometrics. *European Journal of Operational Research*, 246, 1–19.

Mongeon, P., & Paul-Hus, A. (2016). The journal coverage of Web of Science and Scopus: a comparative analysis. *Scientometrics*, 106, 213–228.

Podsakoff, P. M., MacKenzie, S. B., Podsakoff, N. P., & Bachrach, D. G. (2008). 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. *Journal of Management*, 34, 641–720.

Pritchard, A. (1969). Statistical bibliography or bibliometrics? *Journal of Documentation*, 25, 348–349.

Słowiński, R. (2016). Some facts about European Journal of Operational Research. *Technical Report*, Institute of Computing Science, Poznań University of Technology, Poland, http://fcds.cs.put.poznan.pl/Seminaria/EJOR_Report_RS_2016.pdf

Small, H. (1973). Co-citation in the scientific literature: A new measure of the relationship between two documents. *Journal of the American Society for Information Science*, 24, 265–269.

Speranza, M. G. (2012). *Association of European Operational Research Societies*. Wiley Encyclopedia of Operations Research and Management Science.

Valenzuela, L., Merigó, J. M., Johnston, W., Nicolás, C., & Jaramillo, F. (2017). Thirty years of the Journal of Business & Industrial Marketing: A bibliometric analysis. *Journal of Business & Industrial Marketing*, 32, 1–18.

Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84, 523–538.

Zimmermann, H. J. (1995). The founding of EURO The Association of European Operational Research Societies within IFORS. *European Journal of Operational Research*, 87, 404–407.

Appendix: Figure and tables with additional results.

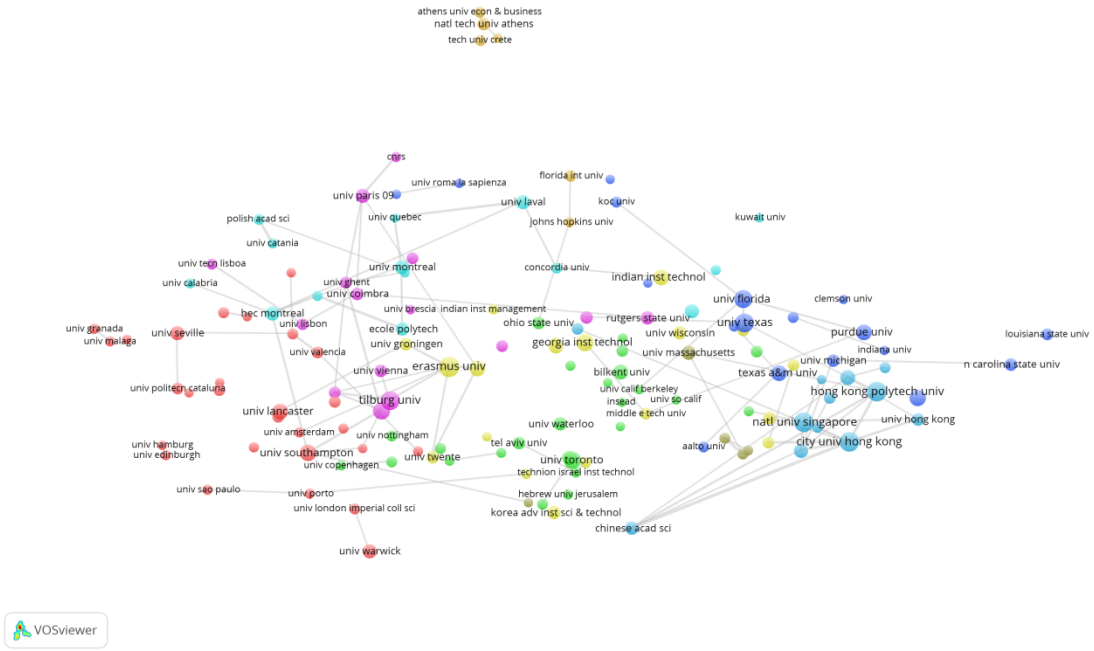

Figure A.1. Co-authorship of institutions publishing in EJOR

Table A.1. Most common author keyword occurrences in EJOR

	Global			2010-2016			2000-2009			1990-1999		
R	Keyword	Oc	Co	Keyword	Oc	Co	Keyword	Oc	Co	Keyword	Oc	Co
1	Scheduling	738	587	Supply chain management	216	162	Scheduling	366	274	Heuristics	254	234
2	Heuristics	677	591	Scheduling	192	149	Heuristics	292	243	Optimization	182	160
3	Inventory	485	314	Data envelopment analysis	185	86	Inventory	240	151	Scheduling	180	146
4	Integer programming	480	376	Game theory	161	120	Integer programming	199	145	Integer programming	128	103
5	Data envelopment analysis	437	215	Integer programming	153	121	Data envelopment analysis	182	83	Linear programming	118	82
6	Supply chain management	399	246	Inventory	133	101	Supply chain management	181	112	Simulation	114	98
7	Simulation	387	296	Combinatorial optimization	132	105	Simulation	169	122	Inventory	112	81
8	Dynamic programming	361	272	Heuristics	131	114	Dynamic programming	154	107	Dynamic programming	98	76
9	Optimization	358	289	Dynamic programming	109	89	Combinatorial optimization	153	130	Mathematical programming	93	77
10	Combinatorial optimization	326	279	Simulation	104	76	Transportation	129	107	Location	80	68
11	Game theory	309	199	Decision analysis	93	62	Optimization	126	96	Production	72	69
12	Linear programming	306	225	Stochastic programming	89	72	Multiple criteria analysis	125	80	Data envelopment analysis	70	41
13	Transportation	264	217	Pricing	88	66	Linear programming	118	84	Tabu search	61	55
14	Decision analysis	229	165	Metaheuristics	85	75	Game theory	117	67	Decision support systems	59	51
15	Location	228	172	Transportation	85	66	Genetic algorithms	114	86	Multiple criteria	59	44
16	Tabu search	219	179	Finance	78	54	Decision analysis	112	79	Decision theory	58	49
17	Decision support systems	217	175	Logistics	77	64	Decision support systems	112	88	Fuzzy sets	50	32
18	Production	217	191	Linear programming	70	58	Tabu search	110	87	Simulated annealing	50	43
19	Finance	207	144	Risk management	69	53	Metaheuristics	101	83	Transportation	50	43
20	Pricing	203	150	Routing	66	53	Fuzzy sets	98	70	Finance	48	34
21	Multiple criteria analysis	195	133	Multiple criteria analysis	62	41	Production	96	80	Modeling	48	42
22	Metaheuristics	189	151	OR in health services	58	51	Location	95	61	Goal programming	46	36
23	Genetic algorithms	173	130	OR in energy	56	44	Pricing	94	69	Branch and bound	45	39
24	Stochastic programming	173	132	Vehicle routing	56	47	Queueing	89	45	Nonlinear programming	45	34
25	Fuzzy sets	169	119	Column generation	55	45	Finance	81	58	Resource allocation	45	40
26	Queueing	160	85	Location	53	40	Logistics	74	60	Networks	44	39
27	Routing	159	133	Robust optimization	51	35	Efficiency	73	64	Planning	43	40
28	Logistics	157	128	Multiple objective programming	50	31	Marketing	70	53	Project management	43	37
29	Mathematical programming	146	114	Optimization	50	35	Neural networks	69	53	Combinatorial optimization	41	39
30	Efficiency	144	124	Production	49	41	Genetic algorithm	68	43	Maintenance	41	36
31	Maintenance	144	110	Reliability	49	28	Goal programming	66	30	Manufacturing	39	30
32	Reliability	143	95	Tabu search	48	39	Stochastic programming	66	50	Artificial intelligence	38	35
33	Nonlinear programming	139	99	Maintenance	47	32	Routing	65	57	Scheduling theory	37	30
34	Marketing	137	101	Queueing	47	23	Multiple objective programming	64	51	Modelling	36	33
35	Branch and bound	132	113	Decision support systems	46	38	Reliability	63	42	Analytic hierarchy process	35	21
36	Manufacturing	129	107	Data mining	44	22	Branch and bound	62	49	Manufacturing industries	35	35
37	Goal programming	127	74	Uncertainty modeling	43	38	Manufacturing	59	45	Production planning	35	25
38	Simulated annealing	120	101	Mixed integer programming	41	33	Nonlinear programming	58	41	Distribution	34	27
39	Forecasting	118	89	Packing	41	30	Global optimization	56	38	Genetic algorithms	34	26
40	Multiple objective programming	118	86	Efficiency	40	30	Maintenance	56	42	Marketing	33	27

Abbreviations: R = rank; Oc = Author keywords occurrences; Co = Author keyword co-occurrences links.

Table A.2. The most productive countries in EJOR

R	Country	TP	TC	*h*	TC/TP	Pop	TP/Pop	TC/Pop	≥100	≥50	≥20
1	USA	4,113	101,993	115	24.80	324,119	12.69	314.68	152	476	1,323
2	UK	1,380	30,786	80	22.31	65,111	21.19	472.82	61	156	382
3	Canada	1,122	29,736	76	26.50	36,286	30.92	819.49	53	140	416
4	China	1,121	24,717	71	22.05	1382,323	0.81	17.88	40	115	342
5	Netherlands	906	18,848	60	20.80	16,980	53.36	1110.01	26	82	263
6	Germany	883	23,305	70	26.39	80,682	10.94	288.85	45	109	276
7	France	868	17,779	60	20.48	64,668	13.42	274.93	28	48	247
8	Spain	802	15,145	55	18.88	46,065	17.41	328.77	23	62	204
9	Italy	605	15,600	59	25.79	59,801	10.12	260.87	14	50	150
10	Taiwan	590	13,642	55	23.12	23,396	25.22	583.09	19	67	256
11	Belgium	516	15,892	62	30.80	11,372	45.37	1397.47	35	82	204
12	Japan	397	9,044	47	22.78	126,324	3.14	71.59	12	44	121
13	Turkey	347	7,010	41	20.20	79,622	4.36	88.04	7	32	112
14	India	343	8,026	43	23.40	1326,802	0.26	6.05	11	36	112
15	Greece	333	6,743	42	20.25	10,919	30.50	617.55	8	32	101
16	Israel	298	5,165	35	17.33	8,192	36.38	630.49	6	23	67
17	Portugal	290	7,050	43	24.31	10,304	28.14	684.20	8	37	104
18	Australia	288	5,690	40	19.76	24,309	11.85	234.07	10	31	84
19	South Korea	274	5,587	41	20.39	50,504	5.43	110.62	9	28	88
20	Finland	252	4,907	36	19.47	5,524	45.62	888.31	5	28	74
21	Poland	251	8,101	49	32.27	38,593	6.50	209.91	15	48	97
22	Brazil	239	3,583	33	14.99	209,568	1.14	17.10	1	13	56
23	Singapore	224	5,132	38	22.91	5,697	39.32	900.82	11	27	70
24	Austria	219	3,162	29	14.44	8,570	25.55	368.96	2	14	46
25	Denmark	201	5,080	38	25.27	5,691	35.32	892.64	9	29	64
26	Switzerland	167	4,748	32	28.43	8,379	19.93	566.65	7	19	51
27	Sweden	163	2,907	32	17.83	9,852	16.54	295.07	0	14	51
28	Norway	146	2,455	28	16.82	5,272	27.69	465.67	2	13	39
29	Iran	140	2,602	26	18.59	80,043	1.75	32.51	2	14	33
30	Hungary	99	1,072	17	10.83	9,821	10.08	109.15	0	2	15
31	New Zealand	92	1,455	24	15.82	4,565	20.15	318.73	0	6	28
32	Chile	76	905	17	11.91	18,132	4.19	49.91	0	2	15
33	Saudi Arabia	74	1,781	23	24.07	32,158	2.30	55.38	2	10	30
34	Russia	63	913	17	14.49	143,440	4.39	63.65	1	4	16
35	South Africa	55	1,148	18	20.87	54,979	1.00	20.88	1	7	18
36	Mexico	55	868	17	15.78	128,632	0.43	6.75	0	5	16
37	Belarus	53	1,914	18	36.11	9,498	5.58	201.52	3	6	16
38	Ireland	51	726	14	14.24	4,809	10.61	150.97	2	2	11
39	Tunisia	47	865	15	18.40	11,375	4.13	76.04	1	5	12
40	Thailand	41	665	18	16.22	68,147	0.60	9.76	0	0	16
41	Colombia	37	1,139	11	30.78	48,654	0.76	23.41	4	6	8
42	Kuwait	36	1,259	17	34.97	4,007	8.98	314.20	1	5	16
43	Czech Republic	30	518	14	17.27	10,548	2.84	49.11	0	1	11
44	Cyprus	25	360	13	14.40	1,177	21.24	305.86	0	0	7
45	Egypt	25	222	8	8.88	93,384	0.27	2.38	0	1	3
46	Malaysia	23	434	13	18.87	7,098	3.24	61.14	0	1	9
47	Romania	22	310	10	14.09	19,373	1.14	16.00	0	0	5
48	Bulgaria	21	171	9	8.14	7,110	2.95	24.05	0	0	1
49	Slovenia	19	235	9	12.37	2,069	9.18	113.58	0	0	5
50	Serbia	18	609	12	33.83	8,813	2.04	69.10	1	1	8

Abbreviations are in Tables 2-5 except for: Pop = Population in thousands; TP/Pop, TC/Pop = Total publications and citations per million inhabitants.

Table A.3. Number of articles from journals and countries citing documents published in EJOR between 1977 and 2000

R	Journal	TP	Country	TP
1	European J Operational Res	7,313	USA	18,016
2	Int J Production Res	2,211	China	13,716
3	Computers Operations Res	2,190	UK	5,535
4	J Operational Research Society	1,906	Taiwan	5,440
5	Int J Production Economics	1,720	Canada	4,884
6	Computers Industrial Engin	1,494	France	3,680
7	Expert Systems with Applic	1,302	Germany	3,507
8	Annals of Operations Res	1,189	Spain	3,502
9	Int J Adv Manufacturing Tech	1,016	Iran	3,131
10	Omega Int J Management Sci	826	India	2,827
11	IIE Transactions	721	Italy	2,791
12	Operations Research	714	Turkey	2,672
13	Applied Math Modelling	551	Netherlands	2,375
14	Management Science	550	Japan	2,185
15	Naval Research Logistics	505	Australia	2,081
16	Fuzzy Sets and Systems	468	S. Korea	1,935
17	Applied Math Computation	462	Belgium	1,590
18	Production Planning Control	397	Brazil	1,538
19	Information Sciences	391	Greece	1,439
20	Transportation Science	381	Poland	1,246
21	Applied Soft Computing	376	Portugal	1,228
22	Mathematical Problems Engin	374	Singapore	1,008
23	Int J Systems Science	370	Israel	965
24	Discrete Applied Mathematics	352	Finland	856
25	Operations Research Letters	351	Malaysia	769
26	Transportation Research Part E	331	Sweden	752
27	Decision Support Systems	331	Austria	699
28	J Intelligent Manufacturing	318	Denmark	665
29	Asia Pacific J Operational Res	315	Switzerland	627
30	Math Computer Modelling	314	Norway	553

Abbreviations are available in Tables 2 and 3.

Table A.4. Number of articles from journals and countries citing documents published in EJOR between 2001 and 2016

R	Journal	TP	Country	TP
1	Eur J Operational Res	5,727	China	22,399
2	Int J Production Res	2,157	USA	13,795
3	Expert Systems with Applic	1,924	Taiwan	6,129
4	Int J Production Economics	1,919	UK	5,840
5	Computers Operations Res	1,795	Spain	4,812
6	Computers Industrial Engin	1,573	Iran	4,619
7	Int J Adv Manufacturing Tech	1,144	Canada	4,434
8	J Operational Research Society	1,124	France	4,428
9	Annals of Operations Research	967	Germany	3,843
10	Mathematical Problems Engin	779	Italy	3,498
11	Applied Soft Computing	745	Turkey	3,230
12	Applied Math Modelling	742	India	3,225
13	Information Sciences	729	Australia	2,465
14	Omega Int J Management Sci	712	Netherlands	2,383
15	Transportation Research Part E	561	Brazil	2,134
16	Applied Math Computation	556	Japan	2,015
17	J Cleaner Production	462	South Korea	1,996
18	J Intelligent Fuzzy Systems	414	Belgium	1,693
19	Knowledge Based Systems	394	Poland	1,510
20	Advanced Materials Research	381	Portugal	1,497
21	Applied Mechanics Materials	363	Singapore	1,349
22	IIE Transactions	360	Greece	1,343
23	Reliability Engin Syst Safety	359	Malaysia	1,251
24	Decision Support Systems	345	Sweden	863
25	Transportation Research Part B	332	Finland	856
26	Production Operations Manag	328	Austria	818
27	Operations Research	312	Switzerland	726
28	Int J Systems Science	306	Israel	725
29	J Intelligent Manufacturing	305	Czech Republic	717
30	Asia Pacific J Operational Res	303	Norway	711

Abbreviations are available in Tables 2 and 3.