EDITORIAL

4OR comes of age

Editorial note

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Abstract

This is the traditional triennial note used by the Editors to give the readers of *4OR* information on the state of the journal and its future. In the three years that have passed since the last editorial note, three volumes (each containing four issues) of the journal have been published: vol. 16 (2018), vol. 17 (2019), and vol. 18 (2020).

1 What has happened?

In the eighteen years that have passed since its foundation, our journal published 517 articles and over 7 000 pages. While in the first years the number of good submissions was scarce and we hardly exceeded 300 pages per volume, the 2020 volume includes 532 pages. The flow of submissions is now satisfactory and we even have a backlog of almost three issues.

Figure 1 shows the Impact Factor obtained by the journal in the last nine years and the corresponding regression line. (Remind that, for the year k, it is normally released in June $k + 1$.) Although there is a clear variance (especially in the last three years), which is normal for journals publishing a relatively small number of articles per year (about 20–25 in our case), the overall trend is very satisfactory.

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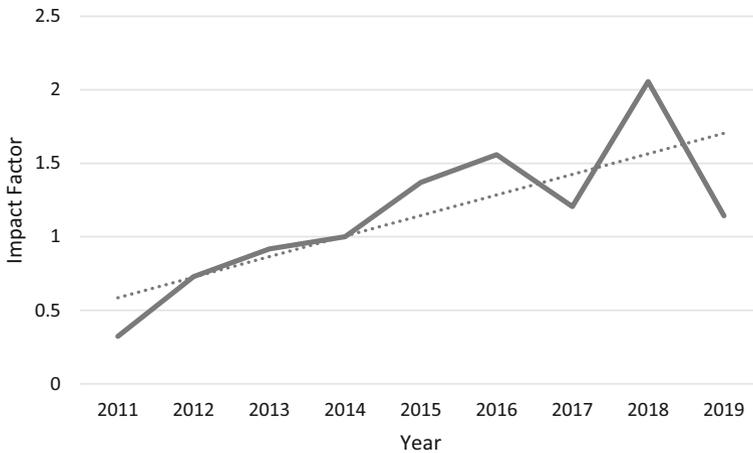
Fig. 1 Trend of Web of Science Impact Factors

The other bibliometric indices are good as well. We had a constant *Scopus* Cite Score (average number of citations received per published document) around 3 (2.8 for 2017, 3.1 for 2018, and 2.9 for 2019).

Scimago currently assigns the journal an H index of 38 (it was 29 three years ago). It classifies *4OR* in four subject areas: *Computational Theory and Mathematics*, *Management Information Systems*, *Management Science and Operations Research*, and *Theoretical Computer Science*. In the last three years, the journal ranked six times in the first quarter and six times in the second quarter.

We keep inviting prominent researchers to submit state-of-the-art surveys to the journal. Thanks to their contribution, we produced a new volume of the *Annals of Operations Research* (Crama et al. 2018a, see Section 4) presenting updated versions of the surveys published in 2015–2017.

We conclude this section with a deep thank to the Associate Editors of *4OR*, whose dedication is a fundamental tool for the success of the journal. Along the triennium, we invited new AEs to join the board, to better reflect the fields of Operations Research in which we get many submissions. We also received a number of self-applications to enter the editorial board, but we had to decline them as we maintain our policy to appoint editors by invitation only.

2 Plagiarism, cheating attempts, and spammers

Previous editorials have reported on exceptionally prolific classic plagiarists (see Bouyssou et al. 2006 and Bouyssou et al. 2009) and on ingenious "innovative" cheaters (see Liberti et al. 2015, Crama et al. 2016, 2018c). Modern, specialized software tools made the life of these individuals less easy, so this time we don't have new tidbits to report.

In the last triennium we mostly had traditional, easily discovered, attempts, like, e.g.,

- Submission of purely plagiarized papers (sometimes by changing some sentences and symbols);
- Simultaneous submission to *4OR* and to another journal.

We just mention a very recent, silly attempt. Two years ago, two authors submitted to one of the Editors a manuscript, that was rejected. One month ago, they submitted the same article (word by word), with a slightly different title, to a different Editor, adding a third person as the corresponding author. Attempt immediately discovered, lol.

In all these cases, the authors have been banned from submitting to the journal and their names have been included in our list of banned authors (see https://www.4or.be/Plagiarism.html).

International journals can also be the target for another, less dangerous but still annoying, category: serial spammers. To make an example, some time ago an author submitted, in few months, six papers on the factors of growth of black pines (Lat. *Pinus nigra*) and their importance for the territory of Šumadije (Serbia). A greater variability was shown by another author who submitted eight papers in two weeks and, later on, two papers in the same day, on subjects ranging from the legal structure of exchange-traded funds to homomorphisms in option-based indices, from the control of monetization of equity based incentives to the effectiveness of legal processes. We normally warn them when rejecting the first submissions and, if they keep submitting, we ban them and report their names to the editorial assistants. Our decision is generally accepted without great problems, although in some cases we get an avalanche of hurtful insults by email, or we are threatened with legal actions.

3 What has been published?

Beside editorials like this one, the journal considers papers for publication in five different sections, namely:

- Invited surveys;
- Research papers;
- Abstracts of PhD theses;
- Industry papers;
- Education papers.

Table 1 provides a brief overview of what has been published in volumes 16–18. As already mentioned, a most significant evolution is that the total number of pages in these three volumes is on the increase when compared to previous years. Excluding a corrigendum, acknowledgments to reviewers, etc., it adds up to 1411 pages, as compared for instance to 1303 pages for volumes 13–15. Regarding the type of papers, we observe that no industry papers or education papers have been published in 2018–2020. On the other hand, the percentage of pages devoted to research papers continues to rise (72.4%, as compared to 64.3% in 2015–2017, 53.7% in 2009–2011 and 56.9% in

Table 1 Types of papers published (2018–2020)

Type of papers	Number of papers	Number of pages	Percentage of pages (%)
Editorials	1	13	0.9
Invited surveys	9	318	22.5
Research papers	43	1022	72.4
PhD Thesis abstracts	29	58	4.1
Industry papers	0	0	0.0
Education papers	0	0	0.0
Total	82	1411	100.0 %

Table 2 Country of origin of invited surveys published (2018–2020)

Country	Number of surveys	Percentage (%)
Italy	3	$33.\overline{3}$
USA	3	$33.\overline{3}$
Canada	1	$11.\overline{1}$
China	1	$11.\overline{1}$
France	1	$11.\overline{1}$
Total	9	100.0 %

2012–2014). In subsequent sections, we provide additional details about each category of papers.

4 Invited surveys

In volumes 16–18, *4OR* published nine invited surveys, with an average length of 35 pages (higher than the 33 pages average in the previous 15 issues). As the journal only publishes state-of-the-art surveys written by well-established scholars at the invitation of the Editors-in-Chief (and collectively reviewed by them), these contributions are quite successful and usually receive a high number of citations. The countries of origin of the surveys are examined in Table 2, where we conventionally record the affiliation of the majority of authors, using that of the principal author to break ties. We detail in Section 4.1 how the *Annals of Operations Research* volume containing the surveys published in volumes 13–15 saw light, while in Section 4.2 we summarize the contents of the invited surveys that were published in volumes 16–18.

4.1 The *Annals of Operations Research* volumes

There is a long standing triennial collaboration between the journal and the Editor-in-Chief of the *Annals of Operations Research*, started in 2006 at the suggestion of the late Peter L. Hammer and continued by his successor Endre Boros. The Editors-in-Chief of *4OR* collect the surveys that appeared in the last three volumes and, invited by

the editor of the Annals, serve as guest editors of an issue that collects them. The first four volumes of this series appeared in Bouyssou et al. (2007), Bouyssou et al. (2010), Liberti et al. (2013), and Liberti et al. (2016). The latest (fifth) issue of this series collects seven surveys that appeared in the triennium 2015–2017. The authors were given the opportunity to correct, revise, update and sometimes substantially improve their past work. We summarize below the contents of the latest volume, referring the reader to Crama et al. (2018b) for a more detailed description.

1. *Large-scale Unit Commitment under uncertainty* (*4OR* 13/2, Tahanan et al. 2015): Milad Tahanan, Wim van Ackooij, Antonio Frangioni, and Fabrizio Lacalandra provide a survey of the literature on methods for all the variants of the uncertain unit commitment problem.
2. *When polynomial approximation meets exact computation* (*4OR* 13/3, Paschos 2015): Vangelis Paschos outlines a relatively new research agenda aiming at building a new approximation paradigm.
3. *Shared mobility systems* (*4OR* 13/4, Laporte et al. 2015): Gilbert Laporte, Frédéric Meunier, and Roberto Wolfler Calvo classify several problems arising in the optimization of shared mobility systems for bicycles and cars.
4. *Vehicle routing problems with multiple trips* (*4OR* 14/3, Cattaruzza et al. 2016): Diego Cattaruzza, Nabil Absi and Dominique Feillet present a unified view of mathematical formulations, exact algorithms, and heuristic approaches for the multi-trip vehicle routing problem and related areas.
5. *Assigned and unassigned distance geometry: applications to biological molecules and nanostructures* (*4OR* 14/4, Billinge et al. 2016): Simon Billinge, Phillip Duxbury, Douglas Gonçalves, Carlile Lavor, and Antonio Mucherino illustrate recent developments for assigned and unassigned distance geometry, a body of knowledge originated by the seminal results found by Menger (1928) and Blumenthal (1953).
6. *Optimization in liner shipping* (*4OR* 15/1, Brouer et al. 2017): Berit Dangaard Brouer, Christian Vad Karsten, and David Pisinger give an overview of advanced modeling and solution methods for a number of optimization problems arising in liner shipping.
7. *Recent contributions to linear semi-infinite optimization* (*4OR* 15/3, Goberna and López 2017): Miguel Angel Goberna and Marco Antonio López review the state-of-the-art in the theory of deterministic and uncertain linear semi-infinite optimization, presenting numerical approaches and describing a selection of recent applications in a variety of fields.

4.2 Invited surveys: 2018–2020

The following nine surveys were published in volumes 16–18.

1. *Nonlinear optimization and support vector machines* (*4OR* 16/2, Piccialli and Sciandrone 2018): Support vector machine is one of the most important classes of machine learning models andalgorithms. Veronica Piccialli and Marco Sciandrone

analyze the main optimization methods for the related training problems, and discuss how their properties can be incorporated in the design of useful algorithms.

2. *Recent studies of agent incentives in internet resource allocation and pricing* (*4OR* 16/3, Cheng et al. 2018): Market makers choose and design market rules to serve certain objectives, such as to maximize revenue from the sales in the case of a single seller and multiple buyers. Today's Internet economy has changed the information collection process and may make some of the assumptions of market rule implementation obsolete. Yukun Cheng, Xiaotie Deng, and Dominik Scheder make a fresh review of works on this challenge on the Internet where new economic systems operate.

3. *A selective survey of game-theoretic models of closed-loop supply chains* (*4OR* 17/1, De Giovanni and Zaccour 2019): Pietro De Giovanni and Georges Zaccour survey two key issues in closed-loop supply chain research: return functions and coordination mechanisms. The return function provides the rule according to which end-of-life/use products are returned to a collector. The coordination mechanisms consist of the adoption of a certain mechanism (e.g., a contract) to align the closed-loop supply chain members' objectives.

4. *Metaheuristics for data mining: Survey and opportunities for big data* (*4OR* 17/2, Dhaenens and Jourdan 2019): In the context of big data, many scientific communities aim to provide efficient approaches to accommodate large-scale datasets. Clarisse Dhaenens and Laetitia Jourdan explain how data mining problems can be considered as combinatorial optimization problems, and how metaheuristics can be used to address them. Four primary data mining tasks are presented: clustering, association rules, classification, and feature selection.

5. *Quantum Bridge Analytics I: a tutorial on formulating and using QUBO models* (*4OR* 17/4, Glover et al. 2019): Quantum bridge analytics relates generally to methods and systems for hybrid classical-quantum computing, and more particularly is devoted to developing tools for bridging classical and quantum computing. In the first of this two-part tutorial, Fred Glover, Gary Kochenberger, and Yu Du focus on the quadratic unconstrained binary optimization model, the most widely applied optimization model in the quantum computing area.

6. *Quantum Bridge Analytics II: QUBO-Plus, network optimization and combinatorial chaining for asset exchange* (*4OR* 18/4, Glover et al. 2020): In the second of this two-part tutorial, Fred Glover, Gary Kochenberger, Moses Ma, and Yu Du introduce the domain of QUBO-Plus models that enable a larger range of problems to be handled effectively. They give special attention to an important instance of these models, called the asset exchange problem). Solutions to this problem enable market players to identify exchanges of assets that benefit all participants.

7. *Essentials of numerical nonsmooth optimization* (*4OR* 18/1, Gaudioso et al. 2020): Approximately 60 years ago two seminal findings, the cutting plane and the subgradient methods, radically changed the landscape of mathematical programming. Convex functions, for which a superb body of theoretical research was growing in parallel, naturally became the main application field of choice. Manlio Gaudioso, Giovanni Giallombardo, and Giovanna Miglionico give a survey of the key ideas underlying successive development of the area which took the name of numerical nonsmooth optimization.

8. *Vehicle routing problems over time: a survey* (*4OR* 18/2, Mor and Speranza 2020): Andrea Mor and Maria Grazia Speranza discuss the different kinds of decisions taken in different classes of vehicle routing problems, and concentrate on the class where the decision about when the routes start from the depot has to be taken. This class of problems includes periodic routing problems, inventory routing problems, vehicle routing problems with release dates, and multi-trip vehicle routing problems.

9. *Mathematical programming formulations for the alternating current optimal power flow problem* (*4OR* 18/3, Bienstock et al. 2020): Power flow refers to the injection of power on the lines of an electrical grid, so that all the injections at the nodes form a consistent flow within the network. Current can either be direct or alternating: while the former yields approximate linear programming formulations, the latter yields nonconvex nonlinear programs in complex numbers. Dan Bienstock, Mauro Escobar, Claudio Gentile, and Leo Liberti derive formulation variants and relaxations of the alternating current optimal power flow problem.

5 Research papers

5.1 Research papers published

Regular papers are the core of the journal. We published 43 such papers in volumes 16–18, giving an average number of 3.58 research papers per issue. For volumes 1–12, we had an average of 2.966. Table 3 details the country of origin of the papers published (using the same convention as above). Belgium, France and Italy account for 7.3 % of all papers, which is much less than usual (22.5 % for volumes 13–15), and with a surprising absence of France (0 papers). Compared to previous volumes, the increase of papers from China and Iran is a confirmed tendency.

The average length of the research papers published in volumes 16–18 is 23.5 pages with a minimum of 10 pages, a maximum of 47 pages and a median of 22 pages. This is detailed in Table 4. Compared with previous volumes, where the median was around 20, there is a slight increase in the length of the papers.

5.2 Selection of research papers

We give here information on the reviewing process of research papers for which a decision was made between 1 January 2018 and 31 December 2020.

Except for few cases of plagiarism that were fortunately detected and a couple of parallel submissions, the reviewing process of the papers was rather smooth. The collaboration between the three editors and the area editors proved effective and efficient.

5.2.1 Rejection rate

Submissions have been following a regular pace. Between 1 January 2018 and 31 December 2020, 662 decisions concerning research or industry papers were made (to

Table 3 Origin of research papers published (2018–2020)

Country	Number of papers	Percentage (%)
China	6	13.6
Iran	6	13.6
Spain	4	9.3
Belgium	3	5.0
Germany	3	7.0
USA	3	7.0
Brazil	2	4.7
Vietnam	2	4.7
The Netherlands	2	4.7
Algeria	1	2.3
Australia	1	2.3
Canada	1	2.3
Denmark	1	2.3
Israël	1	2.3
Italy	1	2.3
Japan	1	2.3
Poland	1	2.3
Switzerland	1	2.3
Taïwan	1	2.3
Turkey	1	2.3
UK	1	2.3
Total	43	100.0

Table 4 Length in pages of research papers published (2018–2020)

Length	Number of papers	Percentage (%)
$x \leq 15$	7	16.3
$16 \leq x \leq 20$	10	23.3
$21 \leq x \leq 25$	9	20.9
$26 \leq x \leq 30$	10	23.3
$31 \leq x$	7	16.3
Total	43	100.0

be compared with 652 in the years 2015–2017, 499 in the years 2012–2014, 219 in the years 2009–2011, 136 in the years 2006–2008, and 189 submissions before 31 December 2005).

A total of 55 research papers were accepted, meaning an overall rejection rate of 92 % (93 % in 2015–2017 and in 2012–2014, 85 % in 2009–2011, 79 % in 2006–2008 and 71 % before 31 December 2005). In order to interpret this, rather high, rejection rate, one should consider that, unfortunately, many submissions either concern topics that are outside Operations Research or are clearly extremely weak: For such cases, in order to save the time of Associate Editors and referees, the Editors-in-Chief adopt a

Table 5 Processing time (in days) of research papers (2018–2020)

Time in days	Number of papers	Percentage (%)
$0 \leq x \leq 20$	293	44.3
$21 \leq x \leq 40$	98	14.8
$41 \leq x \leq 60$	19	2.9
$61 \leq x \leq 80$	16	2.4
$81 \leq x \leq 100$	15	2.3
$101 \leq x \leq 200$	160	24.2
$201 \leq x \leq 300$	43	6.5
$301 \leq x$	18	2.7
Total	652	100.0

desk rejection policy. In addition, one should keep in mind that the editorial policy of the journal, in order to ensure a fast and fair processing of the manuscripts, is to reject all papers needing a major revision. After they have been revised, some of these papers are resubmitted to the journal, in which case they are considered as new submissions.

In order to discourage the submission of very weak manuscripts, in recent years the journal added to its editorial policy two relevant points:

– The journal does not publish articles that simply propose disguised variants of known methods without adequate validation (e.g., metaheuristics that are claimed to be "effective" on the sole basis of metaphorical comparisons with natural or artificial systems and processes). New methods must be presented in metaphor-free language by establishing their relationship with classical paradigms. Their properties must be established on the basis of scientifically compelling arguments: mathematical proofs, controlled experiments, objective comparisons, etc;
– The journal does not publish articles presenting complex variants of classical models (e.g., inventory, production planning or supply chain models) obtained by adding artificial features (multiple objectives, fuzzy parameters, ...), typically formulated as long and unsolvable MIPs, and finally solved through arbitrarily chosen metaheuristics. Such articles do not pass the "innovativeness" criterion, since the same incremental process can be indefinitely applied without bringing any new knowledge about the problem under consideration.

5.2.2 Time before decision

The mean time between the reception of the paper and the communication of the decision to the authors was 76 days, i.e., 2 months and a half (to be compared with 65, 51, 122, 144 and 142 days for papers with a decision in 2015–2017, 2012–2014, 2009–2011, 2006–2008 and before 31 December 2005, respectively), with a median of 25 days, a minimum of 1 day and a maximum of 628 days. Information on the reviewing time of research papers is summarized in Table 5.

For the 607 papers that were rejected, the mean time before decision was 67 days (57, 48, 99, 130 and 125 days for papers processed in 2015–2017, 2012–2014, 2009–

Table 6 Origin and selection of research papers (2018–2020)

Country	Percentage of papers received (%)	Rejection rate (%)
Europe	19.2	75.6
among which BIF [a]	*7.6*	*76.0*
UJTSASAAZ [b]	9.5	88.9
Rest of world	71.3	96.4
Total	100.0	91.7

[a] BIF: Belgium, Italy, France
[b] UJTSASAAZ: USA, Japan, Taiwan, South America, South Africa, Australia, New Zealand

2011, 2006–2008 and before 31 December 2005, respectively) with a minimum time of 1 day and a maximum time of 628 days.

For the 55 papers that were accepted the average time before decision was 169 days, i.e., less than 6 months (165, 92, 253, 198 and 183 days for papers processed in 2015–2017, 2012–2014, 2009–2011, 2006–2008 and before 31 December 2005, respectively) with a minimum of 24 days (corresponding to a paper re-submitted after having been rejected because it needed a major revision) and a maximum of 486 days.

5.2.3 Origin of papers

Table 6 summarizes the country of origin of the submissions for which a decision was made between 1 January 2018 and 31 December 2020 (using the same convention as above; Table 7 gives more details).

The fact that the journal is attracting papers from outside the three promoting countries is confirmed: 53 different countries, to be compared with 61 countries in 2015–2017, 44 countries in 2012–1014, and 33 countries in 2009–2011. It should also be noticed that, within Europe, there is no significant difference between the rejection rate according to the country of origin of the authors: papers coming from Belgium, France or Italy obviously do not receive a special treatment when compared to papers received from other European countries.

A substantial number of papers is received from countries outside Europe and having quite well structured academic systems (mostly from Taiwan and the USA). The very high rejection rate observed for those papers perhaps indicates that researchers from those countries (mistakenly) view *4OR* as a possible outlet for their weaker papers.

Comparing Tables 6 and 7, it is clear that papers coming from outside Europe are mainly coming from countries in which academic institutions are still poorly structured and/or financed. We are sorry to say that, although we received many papers from such countries and in spite of our willingness to help colleagues doing good work under difficult conditions, we have only been able to accept very few of these papers.

Table 7 Origin of research papers received (2018–2020)

Country	Percentage (%)	Country	Percentage (%)
China	27.9	Russian Federation	0.6
Iran	12.5	South Korea	0.5
India	11.5	Morocco	0.5
Turkey	3.3	Thailand	0.5
France	3.2	Greece	0.3
Spain	3.2	Hungary	0.3
Italy	3.0	Indonesia	0.3
Poland	2.9	Kazakhstan	0.3
United States	2.9	Oman	0.3
Viet Nam	2.3	Tunisia	0.3
Australia	2.1	Austria	0.2
Germany	2.1	Bangladesh	0.2
Brazil	1.8	Chile	0.2
Taiwan	1.8	Colombia	0.2
Egypt	1.5	Denmark	0.2
Belgium	1.4	Ghana	0.2
Algeria	1.2	Iraq	0.2
United Kingdom	1.2	Ireland	0.2
Mexico	1.1	Jordan	0.2
Nigeria	1.1	North Korea	0.2
Israël	0.9	Macao	0.2
Malaysia	0.9	Macedonia	0.2
Saudi Arabia	0.9	Mongolia	0.2
Canada	0.8	Slovakia	0.2
Pakistan	0.8	Ukraine	0.2
Portugal	0.8	United Arab Emirates	0.2
Japan	0.6		
Total			100

6 Industry papers

Industry papers consist of case studies, state-of-the-art papers on the applications of OR techniques, or considerations on the practice of OR in industry. We did not publish any industrial paper in volumes 16–18, whereas we had published three such papers in volumes 13–15, two in volumes 10–12, four in volumes 7–9, and six in volumes 4–6. Thus, there is a clear decreasing trend in this category over the years.

Eight industrial papers have been submitted in 2018–2020. Two of them are still in the pipeline at the time of this writing, but six have been rejected after reviewing, for lack of adequation with the general standards of the journal: rigor, innovativeness of the application, quality of writing.

It appears, as already noted in a previous editorial, that the journal is mostly regarded as a pure academic outlet. Nevertheless, the editors are genuinely interested in publishing industrial applications, and they encourage their readers to submit high quality papers in this category.

7 Education papers

The status of the education section of *4OR* is similar, but even more extreme than that of the industrial section, since the journal has not published any paper devoted to OR teaching in many years. This situation is due to evolve with the next volumes, however, since we have recently received several submissions for this section, a couple of which have already been accepted for publication and will appear in the next volumes.

8 PhD Thesis abstracts

4OR aims at increasing the visibility of the Belgian, French and Italian Operations Research societies. With this objective, it regularly publishes two-page abstracts of PhD theses defended in Belgian, French or Italian institutions, or by Belgian, French or Italian citizens who graduated abroad.

In the period 2018–2020, *4OR* has published 29 PhD abstracts of doctoral theses, 16 of which were defended in Belgian universities, 8 in Italian universities, and 5 in French universities.

Compliance with ethical standards

References

Bienstock D, Escobar M, Gentile C, Liberti L (2020) Mathematical programming formulations for the alternating current optimal power flow problem. 4OR-Q J Oper Res 18(3):249–292

Billinge SJL, Duxbury PM, Gonçalves DS, Lavor C, Mucherino A (2016) Assigned and unassigned distance geometry: applications to biological molecules and nanostructures. 4OR-Q J Oper Res 14(4):337–376

Bouyssou D, Martello S, Plastria F (2006) A case of plagiarism: Dănuţ Marcu. 4OR-Q J Oper Res 4(1):11–13

Bouyssou D, Martello S, Plastria F (2007) Surveys in operations research (Invited surveys from 4OR). Annals of Operations Research, Springer, New York

Bouyssou D, Martello S, Plastria F (2009) Plagiarism again: Sreenivas and Srinivas, with an update on Marcu. 4OR-Q J Oper Res 7(1):17–20

Bouyssou D, Martello S, Plastria F (2010) Surveys in operations research II (Invited surveys from 4OR, 2006–2008). Annals of Operations Research. Springer, New York

Brouer BD, Karsten ChV, Pisinger D (2017) Optimization in liner shipping. 4OR-Q J Oper Res 15(1):1–35

Cattaruzza D, Absi N, Feillet D (2016) Vehicle routing problems with multiple trips. 4OR-Q J Oper Res 14(3):223–259

Cheng Y, Deng X, Scheder D (2018) Recent studies of agent incentives in internet resource allocation and pricing. 4OR-Q J Oper Res 16(3):231–260

Crama Y, Grabisch M, Martello S (2016) A brand new cheating attempt: a case of usurped identity. 4OR-Q J Oper Res 14:333–336

Crama Y, Grabisch M, Martello S (2018a) Seven Surveys in Operations Research, Annals of Operations Research. Springer, New York

Crama Y, Grabisch M, Martello S (2018b) Preface. Annals of Operations Research 271:1–2

Crama Y, Grabisch M, Martello S (2018c) Sweet sixteen. 4OR-Q J Oper Res 16:1–13

De Giovanni P, Zaccour G (2019) A selective survey of game-theoretic models of closed-loop supply chains. 4OR-Q J Oper Res 17(1):1–44

Dhaenens C, Jourdan L (2019) Metaheuristics for data mining: survey and opportunities for big data. 4OR-Q J Oper Res 17(2):115–139

Gaudioso M, Giallombardo G, Miglionico G (2020) Essentials of numerical nonsmooth optimization. 4OR-Q J Oper Res 18(1):1–47

Glover F, Kochenberger G, Du Y (2019) Quantum bridge analytics I: a tutorial on formulating and using QUBO models. 4OR-Q J Oper Res 17(4):335–371

Glover F, Kochenberger G, Ma M, Du Y (2020) Quantum bridge analytics II: QUBO-Plus, network optimization and combinatorial chaining for asset exchange. 4OR-Q J Oper Res 18(4):387–417

Goberna MA, López MA (2017) Recent contributions to linear semi-infinite optimization. 4OR-Q J Oper Res 15(3):221–264

Laporte G, Meunier F, Wolfler Calvo R (2015) Shared mobility systems. 4OR-Q J Oper Res 13(4):341–360

Liberti L, Marchant T, Martello S (2013) Surveys in Operations Research III (Invited surveys from 4OR, 2009–2011) Annals of Operations Research. Springer, New York

Liberti L, Marchant T, Martello S (2015) The dirty dozen of 4OR. 4OR-Q J Oper Res 13:1–13

Liberti L, Marchant T, Martello S (2016) Surveys in Operations Research IV (Invited surveys from 4OR, 2012–2014) Annals of Operations Research. Springer, New York

Mor A, Speranza MG (2020) Vehicle routing problems over time: a survey. 4OR-Q J Oper Res 18(2):129–149

Paschos VTh (2015) When polynomial approximation meets exact computation. 4OR-Q J Oper Res 13(3):227–245

Piccialli V, Sciandrone M (2018) Nonlinear optimization and support vector machines. 4OR-Q J Oper Res 16(2):111–149

Tahanan M, van Ackooij W, Frangioni A, Lacalandra F (2015) Large-scale unit commitment under uncertainty. 4OR-Q J Oper Res 13(2):115–171