4OR manuscript No.
(will be inserted by the editor)

21 volumes for the 21st century

Editorial note

Yves Crama · Michel Grabisch · Silvano Martello

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 (Crama et al. (2021)), three volumes (each containing four issues) of the journal have been published: vol. 19 (2021), vol. 20 (2022), and vol. 21 (2023).

1 What has happened?

In the twenty-one years that have passed since its foundation, our journal published over 600 articles and over 9 000 pages. While in the first years the number of good submissions was scarce and we hardly exceeded 300 pages per volume, the 2022 volume included 720 pages, and the 2023 volume included 718 pages. The flow of submissions is now satisfactory and we have a healthy backlog of two-three issues.

Figure 1 shows the Impact Factor obtained by the journal in the last twelve years (we received our first impact factor in 2011) and the corresponding regression line. (Recall that, for the year k, the Clarivate Impact Factor is normally released in June $k+1$.) Although there is some variance, which is normal for journals publishing a relatively small number of articles per year (about 25-30 in our case), the overall trend is very satisfactory.

The other bibliometric indices are good as well. We currently have a *Scopus* Cite Score (average number of citations received per published document) of 4.1. It was around 3 on average in the previous triennium.

Scimago currently assigns the journal an H-index of 45 (it was 38 three years ago, and 29 six years ago). It classifies *4OR* in the second top-quartile in four subject areas: *Computational Theory and Mathematics*, *Management Information Systems*, *Management Science and Operations Research*, and *Theoretical Computer Science*.

Yves Crama
QuantOM, HEC - Management School of the University of Liège, Rue Louvrex 14, 4000 Liège, Belgium Tel: +32 4 366 3077, E-mail: Yves.Crama@uliege.be

Michel Grabisch
Paris School of Economics, Université Paris I 106-112 Boulevard de l'Hôpital, 75013 Paris, France Tel: +33 1 44 07 87 44, E-mail: michel.grabisch@univ-paris1.fr

Silvano Martello
DEI "Guglielmo Marconi", Alma Mater Studiorum Università di Bologna, Viale Risorgimento 2, 40136 Bologna, Italy tel: +39 051 2093022, fax: +39 051 2086272, E-mail: dipdeis.4or@unibo.it

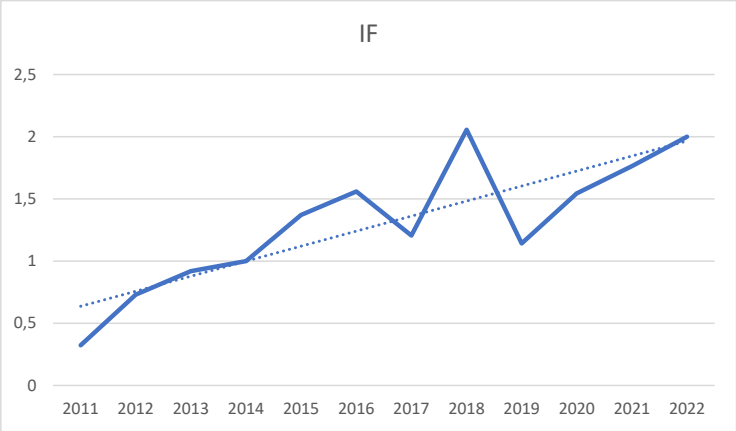

Fig. 1 Trend of Clarivate Impact Factors.

We regularly invite 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. (2022b), see Section 4) presenting updated versions of the surveys published in 2018-2020.

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 gratefully list hereunder the names of the current AEs:

Nabil Absi, École des Mines de Saint-Étienne, France
Alessandro Agnetis, Università di Siena, Italy
Jacek Błażewicz, Poznan University of Technology, Poland
Claudia D'Ambrosio, École Polytechnique, Palaiseau, France
Pietro De Giovanni, SDA Bocconi School of Management, Milan, Italy
Antonio Frangioni, Università di Pisa, Italy
Dorothée Honhon, University of Texas at Dallas, USA
Abdel Lisser, Université Paris-Sud, France
Stefano Lucidi, Università di Roma La Sapienza, Italy
Michele Monaci, Università di Bologna, Italy
Vincent Mousseau, Ecole Centrale Paris, France
Alix Munier, Sorbonne Université - LIP6, Paris, France
Raffaele Pesenti, Università di Venezia Ca' Foscari, Italy
Marc Pirlot, Université de Mons, Belgium
Bernard Ries, Université de Fribourg, Switzerland
Stefan Ruzika, University of Kaiserslautern-Landau, Germany
Marco Sciandrone, Università di Firenze, Italy
Marc Sevaux, Université de Bretagne-Sud, Lorient, France
Maria Grazia Speranza, Università di Brescia, Italy
Frits Spieksma, Eindhoven University of Technology, The Netherlands
Joline Uichanco, University of Michigan, USA

Mutsunori Yagiura, Nagoya University, Japan

We also received a number of self-applications (self-emphasizing the high scientific merits of the candidates) to join the editorial board, but we maintained our policy to appoint editors by invitation only.

2 Plagiarism, cheating attempts, and junk papers

In previous editorials we reported on "professional" plagiarists (see Bouyssou et al. (2006) and Bouyssou et al. (2009)) and new entries in this community (see Liberti et al. (2015), Crama et al. (2016), and Crama et al. (2018b)). 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 fully plagiarized papers (for which the current trend is to modify the text, uselessly trying to cheat the plagiarism detector software), simultaneous multiple submissions, and re-submission of rejected papers with a new title and minimal changes.

The main plague of the journal is currently represented by junk papers, which take most of the editors' time. Consider that the journal currently receives about 330 submissions per year, out of which, roughly speaking,

- about three quarters get desk rejection directly from the Editors-in-Chief;
- the remaining quarter, for which we feel the need of a more specialized opinion, is sent to the Associate Editors, who, in turn, recommend desk rejection for about half of them, and send out the remaining ones to external reviewers;
- on the basis of the reviewers' reports, about half of the remaining submissions are finally accepted for publication.

But what are junk papers? Apart from few manuscripts totally outside Operations Research (a recent submission contained a study on male sexual imagery in advertising!), which can be rejected with a one-line motivation, the majority of junk papers must be read and a report must be written justifying their rejection. In order to make the life of the editors easier, we included in the journals's policy some statements clarifying the characteristics of unacceptable papers, that we report in Section 5.2.1. We hope that this will be a deterrent to serial submitters, although we are not very optimistic about this.

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 19–21. As already mentioned, the total number of pages published in the journal is clearly increasing over time. Excluding a corrigendum, acknowledgments to reviewers, etc., it adds up to 2049 pages, as compared to 1411 pages for volumes 16–18 and to 1303 pages for volumes 13–15.

Contrary to previous years, the journal has published several industry and education papers in 2021-2023. Nevertheless, the percentage of pages devoted to research papers kept increasing (75.9% vs 72.4% in 2018-2020), due to the fact that we publish at most one invited survey in any issue. For the sake of completeness, let us mention that we also exceptionally published (in volume 20) a short "Letter to the Editors" that we found of interest, but that did not fall in any of the standard categories of papers.

In subsequent sections, we provide additional details about each category mentioned in Table 1.

Table 1 Types of papers published in volumes 19–21 (2021–2023)

Type of papers	number of papers	number of pages	percentage of pages
Editorial	1	13	0.6%
Invited surveys	9	335	16.3%
Research papers	61	1556	75.9%
Industry papers	1	27	1.3%
Education papers	4	80	3.9%
PhD thesis abstracts	19	38	1.9%
Total	95	2049	100.0%

4 Invited surveys

In the triennium 2021-2023, our journal published nine invited surveys (one of which was split into two parts). The average length was 32 pages (in line with the previous 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 nationality of the invited author

Table 2 Country of origin of invited surveys published (2021–2023)

country	number of surveys	percentage
France	3	33%
Italy	2	22%
Austria	2	22%
Belgium	1	11%
The Netherlands	1	11%
Total	9	100.0%

We summarize in Section 4.1 the contents of the invited surveys that were published in volumes 19-21, and in Section 4.2 we provide a report on the *Annals of Operations Research* volume containing the surveys published in the previous triennium (volumes 16-18).

4.1 Invited surveys: 2021–2023

The following contributions appeared in volumes 19-21.

1. *The trouble with the second quantifier* (*4OR* 19/2, Woeginger (2021)): The late Gerhard Woeginger presents a multitude of optimization problems that allow natural simple formulations with one existential and one universal quantifier, and discusses the connections to robust optimization and to bilevel optimization.
2. *Frank-Wolfe and friends: a journey into projection-free first-order optimization methods* (*4OR* 19/3, Bomze et al. (2021)): Invented some 65 years ago in a seminal paper by Marguerite Straus-Frank and Philip Wolfe, the Frank-Wolfe method recently enjoys a remarkable revival, fuelled by the need of fast and reliable first-order optimization methods in Data Science and other relevant application areas. Immanuel Bomze, Francesco Rinaldi, and Damiano Zeffiro explain the success of this approach by illustrating versatility and applicability in a wide range of contexts, combined with an account on recent progress.
3. *Challenges and opportunities in crowdsourced delivery planning and operations* (*4OR* 20/1, Savelsbergh and Ulmer (2022)): Crowdsourced delivery involves enlisting individuals to deliver goods and interacting with these individuals through an Internet platform. Importantly, the crowdsourced couriers are not employed by the platform and this has fundamentally changed the planning and execution of the delivery of goods: the delivery capacity is no longer under (full) control of the company managing the delivery. Martin Savelsbergh and Marlin Ulmer present the challenges this introduces, review how the research community has proposed to handle some of these challenges, and elaborate on the challenges that have not yet been addressed.
4. *Matheuristics: using mathematics for heuristic design* (*4OR* 20/2, Boschetti and Maniezzo (2022)): Marco Antonio Boschetti and Vittorio Maniezzo consider heuristic algorithms based on mathematical tools such as the ones provided by mathematical programming and describe the mathematical tools available and the resulting matheuristic approaches, reporting some representative examples from the literature and providing ideas for possible future development.
5. *Home health care routing and scheduling problems: a literature review* (*4OR* 20/3, Euchi et al. (2022)): Home health services arise from the need for hospitals to care for patients and/or dependent persons who, due to special conditions, require hospitalisation and/or care at home. The organisation of this service impacts the quality and cost of health services, which implies the programming of medical and social staff and the design of their daily routes. Jalel Euchi, Malek Masmoudi, and Patrick Siarry review the related literature, proposing a taxonomy and summarizing the state-of-the-art decision-making solutions to deal with these problem.
6. *Moderate exponential-time algorithms for scheduling problems* (*4OR* 20/4, T'kindt et al. (2022)): Vincent T'kindt, Federico Della Croce, and Mathieu Liedloff investigate *moderate exponential-time* algorithms for $\mathscr{NP}$-hard scheduling problems, i.e., exact algorithms whose worst-case time complexity is moderately exponential with respect to brute force algorithms, providing a comprehensive overview of known results and detailing general techniques to derive moderate exponential-time algorithms.
7. *Multiple criteria sorting models and methods* (*4OR* 21/1, Belahcène et al. (2023a) and *4OR* 21/2, Belahcène et al. (2023b)): In this extensive paper, subdivided into two parts,

Khaled Belahcène, Vincent Mousseau, Wassila Ouerdane, Marc Pirlot, and Olivier Sobrie survey the literature on multiple criteria sorting methods, since their origins in the Eighties, focusing on the underlying models. In Part I, they recall two main models (UTADIS and Electre Tri), drawing a picture of the multiple criteria sorting models and the methods designed for eliciting their parameters or learning them based on assignment examples. In Part II they provide a theoretical view of the field and position some existing models within it, discussing issues related to imperfect or insufficient information.

8. *An introduction to variational quantum algorithms for combinatorial optimization problems* (*4OR* 21/3, Grange et al. (2023)): Noisy intermediate-scale quantum computers being now readily available, researchers are experimenting variational quantum algorithms. Camille Grange, Michael Poss, and Eric Bourreau provide a mathematical description of this class of algorithms and concentrate on the quantum approximate optimization algorithm, which is one of the most popular such method studied by the combinatorial optimization community.

9. *A survey of attended home delivery and service problems with a focus on applications* (*4OR* 21/4, Cordeau et al. (2023)): Jean-François Cordeau, Manuel Iori, and Dario Vezzali review a research field that has experienced fast growing interest in the last two decades, with the rapid growth of online platforms and e-commerce transactions: attended home delivery and attended home service problems. They provide an extensive literature review, with a particular focus on real-world applications and a discussion of promising future research directions.

4.2 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 authors are given the opportunity to correct, revise, update and sometimes substantially improve their past work.

The first five volumes of this series appeared in Bouyssou et al. (2007), Bouyssou et al. (2010), Liberti et al. (2013), Liberti et al. (2016), and Crama et al. (2018a). The latest (sixth) issue of this series (Crama et al. (2022b)) collects the surveys that appeared in the triennium 2018-2021. The 61 surveys published in the first 18 years of existence of 4OR offered, in over 2000 pages, an in-depth coverage of many "hot fields" in Operations Research: they were reviewed in Crama et al. (2022a).

We summarize below the contents of the latest volume, referring the reader to Crama et al. (2022c) for a more detailed description.

1. *Nonlinear optimization and support vector machines* [*4OR* 16/2, Piccialli and Sciandrone (2018)]: Veronica Piccialli and Marco Sciandrone present the convex programming problems underlying Support Vector Machine (SVM) models, focusing on supervised binary classification. They analyze the main optimization methods for SVM training problems, and discuss how their properties can be incorporated in designing useful algorithms.
2. *Recent studies of agent incentives in Internet resource allocation and pricing* [*4OR* 16/3, Cheng et al. (2018)]: The emergence of e-commerce and of web-based platforms has

raised the need for the adoption of innovative market mechanisms and allocation rules. Issues related to the strategic manipulability of rules or to the best possible use of available information become crucial and take a new twist in this framework. Yukun Cheng, Xiaotie Deng, and Dominik Scheder provide a review of recent OR publications on these topics.

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 describe latest thinking about two key issues in closed-loop supply chains, namely return functions, which rule the end-of-life of products, and coordination mechanisms, which permit to meet the supply chain members' objectives.
4. *Metaheuristics for data mining: survey and opportunities for big data* [*4OR* 17/2, Dhaenens and Jourdan (2019)]: In this paper, Clarisse Dhaenens and Laetitia Jourdan explain how different data mining tasks can be modeled as combinatorial optimization problems, and how metaheuristic approaches have been used to tackle these problems.
5. *Quantum bridge analytics I: a tutorial on formulating and using QUBO models* [*4OR* 17/4, Glover et al. (2019)]: Motivated by the special role played by quadratic binary optimization (QUBO) models in quantum computing, Fred Glover, Gary Kochenberger, and Yu Du discuss a broad variety of combinatorial optimization problems, which can be formulated as QUBO problems.
6. *Essentials of numerical nonsmooth optimization* [*4OR* 18/1, Gaudioso et al. (2020)] Approximately 60 years ago cutting plane and subgradient methods radically changed the landscape of mathematical programming. Manlio Gaudioso, Giovanni Giallombardo, and Giovanna Miglionico give a survey of the key ideas underlying successive developments of the area, which took the name of numerical nonsmooth optimization, with special focus on the research mainstreams generated under the impulse of the two initial discoveries.
7. *Vehicle routing problems over time: a survey* [*4OR* 18/2, Mor and Speranza (2020)]: Andrea Mor and Maria Grazia Speranza review the literature on the class of vehicle routing problems in which the decision about when the routes start from the depot has to be taken. This class of problems includes the periodic routing problems, the inventory routing problems, the vehicle routing problems with release dates, and the multi-trip vehicle routing problems.
8. *Mathematical programming formulations for the alternating current optimal power flow problem* [*4OR* 18/3, Bienstock et al. (2020)]: The alternating current optimal power flow problem is an optimization problem aiming at generating and transporting electrical power at minimum cost. In this technical survey, Dan Bienstock, Mauro Escobar, Claudio Gentile, and Leo Liberti review mathematical programming formulations of the problem and of its variants and relaxations.
9. *Quantum bridge analytics II: QUBO-plus, network optimization and combinatorial chaining for asset exchange* [*4OR* 18/4, Glover et al. (2020)]: In this paper, Fred Glover, Gary Kochenberger, Moses Ma, and Yu Du extend the range of applications of the QUBO models introduced in Glover et al. (2019). They explain how these models can be tackled by a combination of approaches inspired by classical network theory and by metaheuristic methods.

5 Research papers

5.1 Research papers published

Regular papers are the core of the journal. We published 61 papers in volumes 19–21, giving an average number of 5.08 research papers per issue. This shows a marked increase compared to preceding years, since for volumes 16–18 the average was 3.58, and for volumes 1-12, it was 2.97 research papers per issue. Table 3 details the country of origin of the papers published (using the same convention as above). Belgium, France and Italy account for 31.1 % (among which 19.7 % for France), which is substantially more than usual, especially compared to volumes 16-18 (7.3 %, with 0 papers for France), and volumes 13-15 (22.5 %). Contrarily to the previous volumes, there is a decrease of papers from China and Iran (13.6 % for both in volumes 16-18).

Table 3 Origin of research papers published (2021–2023)

country	number of papers	percentage
France	12	19.7 %
China	7	11.5 %
Germany	7	11.5 %
Italy	6	9.8 %
Vietnam	4	6.6 %
Brazil	3	4.9 %
Iran	3	4.9 %
India	2	3.3 %
Israël	2	3.3 %
Portugal	2	3.3 %
Argentina	1	1.6 %
Australia	1	1.6 %
Bahrain	1	1.6 %
Belarus	1	1.6 %
Belgium	1	1.6 %
Canada	1	1.6 %
Hungary	1	1.6 %
Japan	1	1.6 %
Poland	1	1.6 %
South Korea	1	1.6 %
Spain	1	1.6 %
Turkey	1	1.6 %
UK	1	1.6 %
Total	61	100.0 %

The average length of the research papers published in volumes 19–21 is 25.1 pages with a minimum of 6 pages, a maximum of 54 pages and a median of 25 pages. Compared with previous volumes, where the median was around 20 (22 for volumes 16-18), 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 2021 and 31 December 2023.

Table 4 Length in pages of research papers published (2021–2023)

length	number of papers	percentage
$x \leq 15$	10	16.4 %
$16 \leq x \leq 20$	10	16.4 %
$21 \leq x \leq 25$	13	21.3 %
$26 \leq x \leq 30$	13	21.3 %
$31 \leq x$	15	24.6 %
Total	61	100.0 %

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 2021 and 31 December 2023, 803 decisions concerning research papers were made (to be compared with 662 in years 2018–2020, 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 49 research papers were accepted, meaning an overall rejection rate of 93.9 % (92 % in 2018–2020, 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 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, recently the journal added to its editorial policy that the journal does not publish articles that:

- present 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;
- simply propose disguised variants of known methods or theoretical results like, e.g., 1. "new" metaheuristics that are claimed to be "effective" on the sole basis of metaphorical comparisons with natural or artificial systems and processes, or 2. "new" optimization algorithms derived from existing ones by exploiting some of their "degrees of freedom" to produce formally different but largely equivalent methods, or 3. "new" classes of optimization problems that slightly generalize existing ones, not justified by compelling applications and for which theoretical results barely extend the already available ones,

and that

– new methods must be presented in metaphor-free language and in a way which clarifies their relationship with classical paradigms. Their properties must be established on the basis of scientifically compelling arguments: mathematical proofs, controlled experiments, objective comparisons, etc. Except possibly for the proposal of entirely novel approaches or classes of problems, any theoretical analysis is expected to be complemented with a thorough experimental investigation that clearly proves significant improvements in the computational behavior of the newly proposed approach with respect to all the relevant competitors from the literature or available software packages.

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 70 days, i.e., less than 2 months and a half (to be compared with 76, 65, 51, 122, 144 and 142 days for papers with a decision in 2018–2020, 2015–2017, 2012–2014, 2009–2011, 2006–2008 and before 31 December 2005, respectively), with a median of 21 days, a minimum of 1 day and a maximum of 1086 days, the latter figure being an outlier as the second longest time is 599 days. Information on the reviewing time of research papers is summarized in Table 5.

Table 5 Processing time (in days) of research papers (2021–2023)

time in days	number of papers	percentage
$0 \leq x \leq 20$	402	50.1%
$21 \leq x \leq 40$	164	20.4%
$41 \leq x \leq 60$	32	4.0%
$61 \leq x \leq 100$	15	1.9%
$101 \leq x \leq 200$	96	12.0%
$201 \leq x \leq 300$	50	6.2%
$301 \leq x$	43	5.4%
Total	803	100.0%

For the 754 papers that were rejected, the mean time before decision was 54 days (67, 57, 48, 99, 130 and 125 days for papers processed in 2018–2020, 2015–2017, 2012–2014, 2009–2011, 2006–2008 and before 31 December 2005, respectively) with a minimum time of 1 day and a maximum time of 536 days.

For the 49 papers that were accepted the average time before decision was 309 days (169, 165, 92, 253, 198 and 183 days for papers processed in 2018–2020, 2015–2017, 2012–2014, 2009–2011, 2006–2008 and before 31 December 2005, respectively) with a minimum of 53 days and a maximum of 1086 days. The latter figure which is an outlier caused a sudden increase in the processing time compared with previous years, which is also due to a small number of papers with exceptionally long processing time (about 500 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 2021 and 31 December 2023 (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: 65 different countries, to be compared with 53 countries in 2018–2020, 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 almost no 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 mostly 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 6 Origin and selection of research papers (2021–2023)

country	percentage of papers received	rejection rate
Europe	10.6 %	73.0 %
among which BIF [a]	*5.4 %*	*72.9 %*
UJTSASAAZ [b]	7.0 %	90.9 %
Rest of world	82.3 %	97.0 %
Total	100.0 %	93.9 %

[a] BIF: Belgium, Italy, France

[b] UJTSASAAZ: USA, Japan, Taiwan, South America, South Africa, Australia, New Zealand

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. As already observed in a previous editorial, the number of industry papers published in *4OR* tends to decrease in recent years: only one such paper appeared in volumes 19-21, none in volumes 16–18, three in volumes 13–15, two in volumes 10–12, four in volumes 7–9, and six in volumes 4–6. The number of submissions is rather small, and tentative submissions are frequently turned down for lack of adequacy with the academic standards of the journal.

The lone industry paper published in the latest three-year period is:

A two-objective optimization of ship itineraries for a cruise company (*4OR* 21/4, Di Pillo et al. (2023)): Gianni Di Pillo, Marcello Fabiano, Stefano Lucidi and Massimo Roma consider the Day-by-day Cruise Itinerary Optimization problem faced by a major luxury cruise company. They propose a biobjective Mixed Integer Linear Programming formulation of the problem with the objective of minimizing the fuel and port costs incurred over the itinerary, while maximizing an appropriate attractiveness index. To illustrate their approach, they report on the results obtained on real-world instances.

Table 7 Origin of research papers received (2021-2023)

Country	percentage	Country	percentage
China	33.8 %	Malaysia	0.4 %
India	19.5 %	Nigeria	0.4 %
Iran	9.7 %	United Kingdom	0.4 %
Turkey	5.0 %	Australia	0.2 %
France	2.5 %	Bahrain	0.2 %
Italy	2.3 %	Burkina Faso	0.2 %
Viet Nam	2.2 %	Colombia	0.2 %
Brazil	1.7 %	North Korea	0.2 %
United States	1.7 %	South Korea	0.2 %
Algeria	1.6 %	Mexico	0.2 %
Taiwan	1.6 %	Netherlands	0.2 %
Tunisia	1.6 %	Portugal	0.2 %
Germany	1.1 %	Ukraine	0.2 %
Spain	0.8 %	Austria	0.1 %
Canada	0.7 %	Belarus	0.1 %
Belgium	0.6 %	Bosnia and Herzegovina	0.1 %
Israël	0.6 %	Botswana	0.1 %
Morocco	0.6 %	Chile	0.1 %
Poland	0.6 %	Czech Republic	0.1 %
Saudi Arabia	0.6 %	Hong Kong	0.1 %
Serbia	0.6 %	Indonesia	0.1 %
South Africa	0.6 %	Kuwait	0.1 %
Bangladesh	0.5 %	Nepal	0.1 %
Greece	0.5 %	Norway	0.1 %
Pakistan	0.5 %	Peru	0.1 %
Russia	0.5 %	Qatar	0.1 %
Thailand	0.5 %	Sudan	0.1 %
Argentina	0.4 %	Switzerland	0.1 %
Egypt	0.4 %	Taiwan	0.1 %
Ethiopia	0.4 %	Trinidad and Tobago	0.1 %
Hungary	0.4 %	United Arab Emirates	0.1 %
Iraq	0.4 %	Yemen	0.1 %
Japan	0.4 %		
Total			100 %

7 Education papers

As explained in the editorial policy of the journal, education papers "give a new look and/or comments on existing knowledge, aimed at improving the quality of OR teaching, while also being accessible and interesting to a wider audience". After several years without papers published in this section, we have been happy to publish four such papers in volumes 19-21, namely:

1. *The power of linear programming: some surprising and unexpected LPs* (*4OR* 19/1, Golden et al. (2021)): Bruce Golden, Linus Schrage, Douglas Shier, and Lida Anna Apergi show that linear programming transcends its linear nomenclature and can be applied to an even wider range of important practical problems. The article presents a selection from this range of problems that at first blush do not seem amenable to linear programming formulation.
2. *Using the power of ideal solutions: simple proofs of some old and new results in location theory* (*4OR* 19/3, Plastria (2021)): Frank Plastria observes that, when all objectives of a multi-objective problem have a common minimum, then this ideal solution directly

yields all efficient solutions of the original multi-objective problem, as well as all minimizing solutions of any positively weighted sum of the objectives. Some classical results in location theory are easy consequences of this simple property, which also leads to some lesser known or new results.

3. *Comparing stage-scenario with nodal formulation for multistage stochastic problems* (*4OR* 19/4, Vitali et al. (2021)): Sebastiano Vitali, Ruth Domínguez and Vittorio Moriggia consider two types of formulations that are commonly used for multistage stochastic optimization problems, namely, the stage-scenario formulation and the nodal formulation. The paper aims at helping scholars and practitioners to understand the relation between both formulations, as well as their respective benefits and drawbacks.
4. *Teaching OR: automatic evaluation for linear programming modelling* (*4OR* 20/2, Cambazard et al. (2022)): Hadrien Cambazard, Nicolas Catusse, Nadia Brauner and Pierre Lemaire present the learning platform *caseine.org* which has been designed to automatically evaluate linear programming models and to provide feedback about their validity. The platform is currently used by hundreds of students in different universities to practice with modeling exercises.

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 2021-2023, *4OR* has published 19 PhD abstracts of doctoral theses, 11 of which were defended in Belgian universities, 4 in Italian universities, 3 in French universities, and one in the United States.

This number is smaller than in previous years (29 abstracts in 2018-2020 and 25 in 2015-2017). Clearly, many more than 19 operations research theses have been defended over the last three years in Belgium, France or Italy, or by nationals from the three countries. We encourage all eligible candidates to submit an abstract of their dissertation to the journal, as their publication provides an efficient way to promote their work.

Acknowledgements

We warmly thank once more our board of Associate Editors and all the people that have accepted to referee papers for the journal (the list of referees is published every year in the last issue of each volume). Their help is instrumental in the success of the journal.

References

K. Belahcène, V. Mousseau, W. Ouerdane, M. Pirlot, and O. Sobrie. Multiple criteria sorting models and methods. Part I: survey of the literature. *4OR*, 21(1):1–46, 2023a.

K. Belahcène, V. Mousseau, W. Ouerdane, M. Pirlot, and O. Sobrie. Multiple criteria sorting models and methods. Part II: theoretical results and general issues. *4OR*, 21(2):181–204, 2023b.

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

I.M. Bomze, F. Rinaldi, and D. Zeffiro. Frank-Wolfe and friends: a journey into projection-free first-order optimization methods. *4OR*, 19:313–345, 2021.
M.A. Boschetti and V. Maniezzo. Matheuristics: using mathematics for heuristic design. *4OR*, 20(2):173–208, 2022.
D. Bouyssou, S. Martello, and F. Plastria. A case of plagiarism: Dănuţ Marcu. *4OR*, 4(1):11–13, 2006.
D. Bouyssou, S. Martello, and F. Plastria. (eds.) *Surveys in Operations Research (Invited surveys from* 4OR*)*, volume 153 of *Annals of Operations Research*. Springer, New York, 2007.
D. Bouyssou, S. Martello, and F. Plastria. Plagiarism again: Sreenivas and Srinivas, with an update on Marcu. *4OR*, 7(1):17–20, 2009.
D. Bouyssou, S. Martello, and F. Plastria. (eds.) *Surveys in Operations Research II (Invited surveys from* 4OR*, 2006-2008)*, volume 175 of *Annals of Operations Research*. Springer, New York, 2010.
H. Cambazard, N. Catusse, N. Brauner, and P. Lemaire. Teaching OR: automatic evaluation for linear programming modelling. *4OR*, 20(2):333–345, 2022.
Y. Cheng, X. Deng, and D. Scheder. Recent studies of agent incentives in internet resource allocation and pricing. *4OR*, 16(3):231–260, 2018.
J.-F. Cordeau, M. Iori, and D. Vezzali. A survey of attended home delivery and service problems with a focus on applications. *4OR*, pages 1–37, 2023.
Y. Crama, M. Grabisch, and S. Martello. A brand new cheating attempt: a case of usurped identity. *4OR: A Quarterly Journal of Operations Research*, 14:333–336, 2016.
Y. Crama, M. Grabisch, and S. Martello. *Seven Surveys in Operations Research*, volume 271 of *Annals of Operations Research*. Springer, Norwell, United States-Massachusetts, New York, 2018a.
Y. Crama, M. Grabisch, and S Martello. Sweet sixteen. *4OR: A Quarterly Journal of Operations Research*, 16:1–13, 2018b.
Y. Crama, M. Grabisch, and S. Martello. 4OR comes of age: Editorial note. *4OR*, 19:1–13, 2021.
Y. Crama, M. Grabisch, and S. Martello. Sixty-one surveys in operations research. *Annals of Operations Research*, 314(1):5–13, 2022a.
Y. Crama, M. Grabisch, and S. Martello. *Surveys in Operations Research VI (Invited Surveys from 4OR, 2018-2020)*, volume 314 of *Annals of Operations Research*. Springer, Norwell, United States-Massachusetts, New York, 2022b.
Y. Crama, M. Grabisch, and S. Martello. Preface. *Annals of Operations Research*, 314:1–2, 2022c.
P. De Giovanni and G. Zaccour. A selective survey of game-theoretic models of closed-loop supply chains. *4OR*, 17(1):1–44, 2019.
C. Dhaenens and L. Jourdan. Metaheuristics for data mining: Survey and opportunities for big data. *4OR*, 17 (2):115–139, 2019.
G. Di Pillo, M. Fabiano, S. Lucidi, and M. Roma. A two-objective optimization of ship itineraries for a cruise company. *4OR*, pages 1–27, 2023.
J. Euchi, M. Masmoudi, and P. Siarry. Home health care routing and scheduling problems: a literature review. *4OR*, 20(3):351–389, 2022.
M. Gaudioso, G. Giallombardo, and G. Miglionico. Essentials of numerical nonsmooth optimization. *4OR*, 18(1):1–47, 2020.
F. Glover, G. Kochenberger, and Y. Du. Quantum bridge analytics I: a tutorial on formulating and using QUBO models. *4OR*, 17(4):335–371, 2019.
F. Glover, G. Kochenberger, M. Ma, and Y. Du. Quantum bridge analytics II: QUBO-Plus, network optimization and combinatorial chaining for asset exchange. *4OR*, 18(4):387–417, 2020.
B. Golden, L. Schrage, D. Shier, and L.A. Apergi. The power of linear programming: some surprising and unexpected LPs. *4OR*, 19(1):15–40, 2021.
C.. Grange, M. Poss, and E. Bourreau. An introduction to variational quantum algorithms for combinatorial optimization problems. *4OR*, 21(3):363–403, 2023.
L. Liberti, T. Marchant, and S. Martello. (eds.) *Surveys in Operations Research III (Invited surveys from* 4OR*, 2009-2011)*, volume 204 of *Annals of Operations Research*. Springer, New York, 2013.
L. Liberti, T. Marchant, and S Martello. The dirty dozen of 4OR. *4OR: A Quarterly Journal of Operations Research*, 13:1–13, 2015.
L. Liberti, T. Marchant, and S. Martello. (eds.) *Surveys in Operations Research IV (Invited surveys from* 4OR*, 2012-2014)*, volume 240 of *Annals of Operations Research*. Springer, New York, 2016.
A. Mor and M.G. Speranza. Vehicle routing problems over time: a survey. *4OR*, 18(2):129–149, 2020.
V. Piccialli and M. Sciandrone. Nonlinear optimization and support vector machines. *4OR*, 16(2):111–149, 2018.
F. Plastria. Using the power of ideal solutions: simple proofs of some old and new results in location theory. *4OR*, 19(3):449–467, 2021.

M.W.P. Savelsbergh and M.W. Ulmer. Challenges and opportunities in crowdsourced delivery planning and operations. *4OR*, 20(1):1–21, 2022.
V. T'kindt, F. Della Croce, and M. Liedloff. Moderate exponential-time algorithms for scheduling problems. *4OR*, 20(4):533–566, 2022.
S. Vitali, R. Domínguez, and V. Moriggia. Comparing stage-scenario with nodal formulation for multistage stochastic problems. *4OR*, 19(4):613–631, 2021.
G.J. Woeginger. The trouble with the second quantifier. *4OR*, 19(2):157–181, 2021.