Article Processing Charges and Read & Publish agreements Monitor @Unimore 2020-2023

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Abstract (en)

The report analyzes Unimore's expenditure on publication activities by its researchers from 2020 to 2023, with particular emphasis on the rising costs associated with open access publishing. The analysis encompasses both direct expenditures related to article processing charges (APCs) and those incurred through Read & Publish (R&P) agreements.

Keywords

Open Access, APCs, Unimore, *Read&Publish* Agreements, Scientific Publication

SUMMARY

EXECUTIVE SUMMARY

Purpose. Understanding how much Unimore spends on scholarly publishing and monitoring the evolution of this expenditure over time is crucial for assessing the financial burden of scientific literature on the university. In particular, it is important to quantify the costs—consistently increasing year over year—associated with open access publishing. Overall expenditure on APCs (Article Processing Charges) is rising, both in terms of total spending and average cost per article. At the same time, the costs of publisher contracts are also increasing—a well-known trend—further amplified by the publish component embedded in Read & Publish agreements. The APCs paid by Unimore, along with the Read & Publish contracts in effect between 2020 and 2023, constitute the focus of "APCs + R&P Monitor @Unimore 2020–2023" report.

Design/methodology/approach. The scientific output of an institution is by its very nature constantly evolving, as is the indexing and thus the discoverability of individual publications. For this reason, a multiple-data-sources (Iris and Scopus) snapshot was taken in mid-2024. The data were then cleaned, enriched and structured to allow multi-dimensional analysis. This methodological approach ensures that the publication data used in the analysis are highly reliable, with any gaps confined to the year 2023.

As for cost tracking, the strength of this analysis lies in its reliance on actual expenditures as recorded in the university's accounting system. Some limitations exist in the case of APCs: the information recorded in individual accounting entries was not always sufficient to clearly identify the type of expenditure and/or the related publication. However, a detailed review of each entry combined with the introduction in 2021 of specific accounting categories enabled the resolution of this issue in the vast majority of cases.

Findings. Among the over 14,000 publications generated during the four-year period, 36% are open access (45% in 2023). Of these, 70% are concentrated among just six publishers: 30% are published by MDPI, another 30% by Springer Nature, Elsevier and Wiley combined, and 10% by Frontiers and BMC. Gold open access accounts for 71% of all open access publications, although this share is declining in favor of hybrid models.

APCs. Over the four-year period, 804 APCs were paid, amounting to approximately €1.6 million, of which 80% (€1.3 million) was covered by Departments and Centers in the biomedical area. Seven publishers account for 81% of the total APC expenditure, with MDPI alone representing the largest share at 31%. Gold open access accounts for 86% of the APCs, corresponding to a total expenditure of €1.3 million.

R&P. Expenditure on journal and database subscriptions was €8 million over the four-year period, with a 23% increase from 2020 to 2023. In 2020 four Read & Publish agreements were in place; by 2023 this number had grown to nine, with a total cost of €1.5 million, of which a significant portion (nearly €1 million) was allocated to Elsevier.

Basic Glossary

APC: The fee paid to publish a work in open access.

Big Deal: A contract between an institution and a publisher that provides institutional affiliates with access to a large package of the publisher's resources, such as journals and databases.

DOAJ (Directory of Open Access Journals): Global index of open access journals (diamond/gold), used as a reference for assessing the reliability of such journals.

Full Open Access Publisher: A publisher that makes all of its content available in open access.

Hybrid Publisher: A publisher that offers both open access and subscription-based content.

Gold Open Access: A journal is considered gold if it publishes all contributions in open access; a publication is gold OA if it appears in a gold journal.

Hybrid Open Access: A journal is hybrid if it publishes both open access and non-open access contributions; a publication is hybrid OA if it appears in a hybrid journal.

IRIS Unimore: The institutional repository of research outputs authored by affiliates of Unimore.

Open Access (OA): Free and unrestricted online availability of scientific content, enabled by a license that allows all legal uses while preserving the author's rights.

Open Access Status: The type of open access associated with a publication (e.g. gold OA or hybrid OA).

Publish Component: The portion of a Read & Publish (R&P) agreement between a publisher and an institution that covers the cost of open access publishing for institutional affiliates.

Read & Publish (R&P): A publisher-institution agreement that ensures both access to the publisher's journals (read) and the ability to publish a specified number of OA contributions (publish).

Scopus: Citation and abstract database developed by Elsevier dedicated to the international scientific community.

Bibliometric Office: A unit within Unimore's university library system responsible for research assessment and open science activities.

Unpaywall: Open database of scholarly articles.

Data Sources

The data sources utilized for the purposes of this report are:

- For Unimore's scientific output from 2020 to 2023, the UNIMORE 2018-2023 report produced by the Bibliometric

Office finalized as of June 13, 2024; this report draws upon data from both IRIS Unimore and Scopus.

- For open access scientific output, the same UNIMORE 2018-2023 report, which uses Scopus as the source to determine the type of open access associated with publications (subject to the limitations described below).
- For APCs (Article Processing Charges) covered by Unimore in the biennium 2022-2023, the accounting management software in use at Unimore, namely U-Gov Contabilità (data extracted from IRIS Unimore on April 16, 2024).
- For APCs covered by Unimore in 2020-2021, U-Gov Contabilità (with data provided by the Office of Directional Coordination and Management Control, extracted on October 6, 2021).
- For Unimore's scientific output and APCs from 2015 to 2019, for comparative purposes, the APC Monitor @UNIMORE 2015-2019 report (and the corresponding data as per the sources indicated in the report).
- For the costs of contracts with publishers (both Read & Publish and others), data from U-Gov Contabilità provided by the University Library System.
- For the costs of competitive contracts for the acquisition of printed and online books and periodicals, data from Sebina collected in the file 241004_SBA_SPESE BD-PERIODICI-GARA.
- For publications under Read & Publish agreements, the platforms provided by publishers as well as email confirmations from publishers regarding affiliations.
- For journals indexed in DOAJ, the "exportable version of the journal metadata" file exported from DOAJ on May 3, 2024.

Data Processing

The data collected from various sources were cleaned, enriched and organized to enable multi-level and multi-dimensional analysis. In general, the following operations were performed (among others): standardization of publisher names; integration of publisher open access type (full OA/hybrid) and of departmental area; identification of type of expenditure (detailed and macro categories) and subsequent possible reclassification; removal of duplicates and errors; identification of publications linked to expenditures and related actions. Mentioned actions included: integration of the best open access type for the publication (gold/hybrid) and of DOI, ISBN, other publication links, journal name, journal ISSN and integration of DOAJ journal data.

Analytical Limitations

The scientific output of an institution is, by its very nature, constantly evolving, as is the indexing and thus the retrievability of individual publications, which may require several months to be

completed. It is therefore impossible to consider the data relating to scientific production for the period 2020–2023 as entirely accurate and exhaustive. However, the fact that a final snapshot was taken in mid-2024 allows us to consider these data as highly reliable, with any gaps being largely confined to the year 2023.

Although several subsequent updates were carried out and data from multiple sources were used with careful deduplication efforts, it is not possible to completely eliminate the risk of duplicate records. Some errors can be attributed to the data sources themselves: IRIS Unimore is populated directly by the authors, which, despite back-office interventions, cannot fully guarantee completeness or accuracy; Scopus, in addition to requiring the aforementioned technical time for indexing, is also subject to errors in the attribution of publications to their respective authors, duplications and other issues. In any case, every effort has been made to minimize these problems including targeted verifications.

The above considerations are even more pertinent with regard to the identification of open access publications. Given that IRIS data are not reliable and were therefore not considered, the Scopus data used suffer from several shortcomings: first, all scientific output not indexed by Scopus is excluded (which includes a significant portion of the humanities and social sciences, among others); moreover, there are numerous cases of indexed publications for which the open access type is not specified. It should be noted that, for publications associated with APCs, the open access status was verified individually and is therefore not affected by this limitation, which instead applies to the analysis of scientific output for 2020–2023. The integration in 2024 of open access data from Unpaywall into IRIS may allow IRIS to be used as a more reliable and comprehensive data source for future analyses.

With regard to APCs, two main types of errors are possible: (1) incorrect identification of the type of expenditure and (2) erroneous or, in some cases, impossible association of the expenditure with the corresponding publication. The likelihood of the first error, although not entirely eliminable, is reduced by the verification of each expenditure description and by the introduction, from 2021 onwards, of specific accounting entries for the three main types of publication expenses (open access, non-open access, editorial services), along with corresponding instructions for staff. Concerning the above-mentioned second possible error, the same instructions have facilitated the research process to some extent.

There have been cases where a genuine investigative effort was required to identify a publication associated with a specific expenditure. However, the margin of error can be considered low, as is the number of unlinked expenditures and publications. For both issues, a significant development for future analyses will be the introduction, in IRIS Unimore from 2024 onwards, of a form for requesting payment of publication expenses, which will also require the attachment of the relevant invoice. This will allow both verification of the appropriateness of the expenditure concerning the accounting entry used for payment and, crucially, the error-free linkage of the expenditure to the corresponding publication (since the form will require the entry of bibliographic references).

PUBLICATIONS

Number of publications

Authors affiliated with Unimore have produced over 14,000 scientific contributions between 2020 and 2023, averaging 3,616 publications per year. This output shows no evident upward or downward trend, unlike the period from 2015 to 2019, which saw a 23% increase over five years.

Open access%

Overall, 36% of these contributions are available in open access, a proportion that has doubled compared to 2015–2019 and continues to grow. By 2023, 45% of publications were open access.

Gold OA%

Although the share of gold open access publications has declined over the four-year period (from 75.7% in 2020 to 63.4% in 2023) and compared to 2015–2019, it still accounts for 71% of all OA publications, while hybrid OA represents 29%.

Publications by Department/Discipline

Area 6 and 9 (Italian Academic Areas per Discipline) together account for half of Unimore's total research output, with 5,201 publications in area 6 and 2,355 in area 9 (a combined total of 7,515 works with at least one author from either area). Area 12 ranks third, contributing 925 publications. At the departmental level, BMN, CHIMOMO, SMECHIMAI and DIEF exhibit the highest publication volumes, with 2,092, 1,946, 2,182 and 2,092 publications, respectively, significantly outpacing other departments.

Publications by Department/Discipline

The highest number of open access publications originates from biomedical departments (BMN, SMECHIMAI, CHIMOMO, DSV). However, in terms of open access proportion, natural sciences lead, with areas 5 and 7 reaching approximately 63%, and areas 2 and 3 surpassing 50%, while area 6 remains at 49%. Conversely, humanities and social sciences exhibit notably low open access rates, with area 12 at the bottom, with only 0.2%.

Publications by Author

Authors in area 6 are the most prolific, averaging 29 contributions per individual, including an average of 14 open access publications. In contrast, open access production remains marginal among researchers in humanities, particularly in area 12, despite their relatively high overall productivity (14 publications per author on average).

Publications by Publisher

Out of 14,465 total publications, 35% are associated with three major publishers, while 50% are distributed among seven: Elsevier 1,822 publications (12.6%), Springer Nature 1,687 (11.7%), MDPI 1,547 (10.7%), Wiley 941 (6.5%), IEEE 676 (4.7%), Frontiers 347 (2.4%), Taylor & Francis 291 (2%).

OA Publications by Publisher

Three fully open access publishers and four hybrid publishers account for 70% of open access publications in this period. 30% of open access publications are published by MDPI. Another 30% is collectively contributed by Springer Nature, Elsevier and Wiley, with an even distribution between gold and hybrid open access models. The remaining 10% consists of publications from Frontiers (6.7%) and BioMed Central (3%).

PUBLICATION EXPENDITURE

Total Expenditure

Over the four-year period, Unimore allocated nearly €2 million for publication costs—more than double the amount spent during 2015–2019. Of this total, 82% was dedicated to open access publishing. The most significant increase in expenditure occurred between 2019 and 2021.

Expenditure by Department

Medical departments and research centres accounted for the highest expenditures, totalling €1.1 million (57% of Unimore's total publication expenditure), of which €1 million was allocated to open access publishing.

Expenditure by Publisher

Ten publishers accounted for 75% of the total expenditure: MDPI (26%), Frontiers (13%), Springer Nature (9%), Elsevier (8%), Wiley (4%) and BioMed Central (4%). The main Italian publisher was Giappichelli, accounting for 2% of total expenditure.

Expenditure on APCs

During the four-year period, 804 APCs were paid, amounting to approximately €1.6 million. There was a 42% increase in APC expenditure between 2020 and 2021, followed by a 13% decrease between 2021 and 2023.

APCs by Disciplinary Area

The biomedical field accounted for 80% of APC expenditure, approximately €1.3 million. This was followed by the technological sciences (12%) and natural sciences (6%). Humanities and social sciences registered the lowest expenditure, with just 2%.

APCs by Publisher

Seven publishers represented 80% of the total APC expenditure. MDPI led with 31%, followed by Frontiers (16%), Springer Nature (11%), Elsevier (9%), BioMed Central (5%), Wiley (4%) and Oxford University Press (4%).

APCs by Publisher: full OA vs hybrid

Of the total APC expenditure, 59% went to fully-OA publishers and 41% to hybrid publishers. Although both categories exhibited an increase, their expenditure converged in 2023: fully-OA publishers saw a 28% decline, while hybrid publishers experienced a 17% increase.

Average APCs cost

The average APC cost increased by 16% (€2,195 in 2023). That year, the average APC cost nearly converged between fully-OA and hybrid publishers: from 2020 to 2022, hybrid publishers were on

average €960 more expensive, whereas in 2023 the difference dropped to just €89 (€2,176 vs. €2,265).

APCs by Journal

A quarter of APC-funded publications were concentrated in just 13 journals— 7 of which published by MDPI. The journal with the most publications (41) was the *International Journal of Molecular Sciences* (MDPI), followed by *Scientific Reports* (Springer Nature) with 23 and *Cancers* (MDPI) with 19.

Gold OA vs hybrid OA

Gold open access accounted for 86% of APCs, corresponding to €1.3 million. Between 2020 and 2023, the average APC cost was €1,920 for gold OA, compared to €2,619 for hybrid OA—36% higher. In 2023 gold OA decreased by 16% while hybrid OA rose by 16%. Additionally, the average APC costs converged: €2,176 for gold OA (+10% vs. 2022) and €2,265 for hybrid OA (–24% vs. 2022).

Gold OA and DOAJ

83% percent of gold OA publications appeared in journals indexed in the Directory of Open Access Journals (DOAJ). All 32 journals from Frontiers, 15 from Springer Nature and 6 from Hindawi with paid APCs were DOAJ-indexed. Of MDPI's 62 journals, 58 (93%) were indexed; for BioMed Central, 24 of 26 (92%); for Elsevier, 21 of 24 (87.5%); and for Wiley, 13 of 15 (87%).

SUBSCRIPTION EXPENSES

Total Expenditure

Unimore spent €10.4 million over four years on journal and database subscriptions as well as the purchase of books and print periodicals. This represents an increase of 4.7% from 2020 to 2023.

Big Deals and Read&Publish

Expenditure on journal and database subscriptions amounted to nearly €8 million, reflecting an increase of 23% from 2020 to 2023.

R&P Contracts

In 2020, four Read & Publish (R&P) agreements were active for a total value of €332,000. By 2023, this number rose to nine agreements with a total value of €1.5 million. Of this amount, €978,000 (65%) was allocated solely to Elsevier. This was followed in order of expenditure by contracts with Wiley (€239,000), IEEE (€97,000), ACS (€77,000), Lippincott (€64,000), Cambridge University Press (€23,000), IOP (€18,000), Emerald (€17,000) and ACM (€7,000).

R&P Publications

In 2023 alone, 113 publications were produced under the Elsevier agreement. Between 2021 and 2023, 124 publications were produced with Wiley. During 2022 and 2023, 29 publications were produced with IEEE and 24 with ACM. Over the four-year period, 23 publications were associated with ACS, 14 with Emerald and 12 with Cambridge University Press. Only six publications were produced with Lippincott, all in 2021.

R&P and APCs

Despite the presence of active R&P agreements, APCs continued to be paid to Elsevier, IEEE and Wiley. This was consistent with patterns observed prior to the implementation of the respective R&P agreements. These agreements led to an exponential increase in open access publications with the three publishers, particularly in hybrid formats.

“Declared” publishing component

Based on the values reported in invoices or contracts for 2023 by Elsevier, IEEE and Wiley, the declared publish component of the respective agreements amounted to approx. €345,000 (35% of the total cost), €8,000 (9%) and €144,000 (60%). Average cost per article was €3,050 for Elsevier, €400 for IEEE and €3,270 for Wiley. Compared to the average APCs paid in the same year, these costs were 12–15% lower for Elsevier and Wiley and 141% higher for IEEE.

“Actual” publishing component

Based on a comparison between the final year of a standard contract and the first year under an R&P agreement, and considering the number of articles actually published, the actual publish component varied significantly among publishers. It ranged from 0% to 19% of the total contract cost, while overall contract costs increased by 0% to 24%. The average cost per article also showed wide variability, ranging from €115 to €2,236, but was in all cases lower than the average APCs paid to the same publishers.

CONCLUSIONS

Over the four-year period under review, despite stable levels of scientific output, Unimore progressively increased its number of open access publications while simultaneously contributing more to associated costs, both directly (via APCs) and indirectly (through read-and-publish agreements).

Of the 14,465 publications produced between 2020 and 2023, 5,175 (36%) were published in open access. 1,149 (22%) were supported by expenditures sustained by Unimore, 804 (70%) through APCs and 345 (30%) through the publishing component of read-and-publish agreements.

On Open Access production

In the face of a slight decline (-3%) in the total number of publications (likely attributable to the incomplete indexing of 2023 publications in Scopus), open access publications increased over the four-year period both in absolute terms (+557, equivalent to +55%) and in proportion to the total output, reaching 45% of all publications in 2023, compared to 28% in 2020.

Simultaneously, the number of open access publications funded by Unimore (via APCs or under R&P agreements) more than doubled (+121%), leading to an increase in the total OA output with Unimore authors: from 18% in 2020 to 25% in 2023. In practical terms, one in four OA publications in 2023 received financial support from Unimore, compared to slightly fewer than one in five in 2020.

These increases (in both absolute terms and overall share) are primarily attributable to open access publications under read-and-publish agreements. While in 2020, 95% of open access publications funded by Unimore were supported through APCs, in 2023 this proportion dropped to 46%, with the remaining 54% published under read-and-publish agreements (largely due to 113 publications with Elsevier).

On publication expenditure

Between 2020 and 2023, expenditure on APCs amounted to €1.6 million, with an overall upward trend of 23%. Two opposing trends should be noted: an increase in spending between 2020 and 2021 of 42% (following a 55% rise from 2019 to 2020) and a subsequent decrease of 13% from 2021 to 2023. This decline may be attributed to the activation of several read-and-publish agreements.

By 2023, read-and-publish agreements accounted for €1.5 million in expenditure, four and a half times their 2020 value. Once again, the agreement with Elsevier, activated in 2023, explains much of this, representing 65% of the total expenditure. It is difficult, if not impossible, to determine precisely how much of the cost of R&P agreements is attributable to the publishing component.

Depending on the perspective adopted (declared quota vs. "actual" value), the figures vary substantially: from 13% to 35% of the total cost in the case of Elsevier, from 8.6% to 18.8% for IEEE, from 20% to 2.9% for Wiley. Similarly wide is the variation in the average cost per article depending on the calculation method used.

In any case, R&P agreements active between 2020 and 2023 cost on average 10% more in their first year of validity compared to previous standard contracts (including 3% adjusted inflation), with values significantly above average for ACM, Elsevier and IEEE (respectively 19%, 16% and 24%). Nevertheless, the number of published articles may justify the expenditure.

On authors, Dep. and areas

Authors in the medical area are the most productive both in absolute terms and in terms of open access publications. This high output is reflected in the costs incurred by medical departments: over €1 million spent on APCs, representing 65% of the total APC expenditure over the four-year period.

In the humanities, publication volumes are understandably lower, with low percentages of OA contributions. Humanities departments, however, lead in spending on standard publication costs (i.e. editing and print contracts).

On fully-OA and hybrid publishers

Elsevier, Springer Nature and MDPI are the most frequently used publishers by Unimore authors (respectively 13%, 12% and 11% of total publications). MDPI ranks first by far in terms of open access publication share: it accounts alone for 30% of the total, equivalent to the combined total of Springer Nature, Elsevier and Wiley.

With regard to APCs paid by Unimore, 59% of the expenditure over the four-year period went to fully open access publishers and 41% to hybrid publishers, although in 2023 the expenditure decreased for the former and increased for the latter. MDPI received €506,000, followed by Frontiers with €255,000, Springer Nature with €177,000 and Elsevier with €149,000.

The average APC for fully open access publishers was €1,898 and €2,203 for hybrid publishers (a difference of 16%), with significant variations in trends between 2020 and 2023: MDPI's average APC increased by 11% and Elsevier’s by 85%. Springer Nature's annual average APC increased by 15% and was the highest over the four-year period (nearly €3,000).

Gold open access accounted for 86% of the APCs, equivalent to €1.3 million, with an average APC of €1,920 compared to €2,619 for hybrid open access. However, in 2023, gold open access expenditures decreased by 16% and hybrid open access expenditures increased by 16% and the average annual APCs for gold and hybrid open access nearly converged.

On the future

This report highlights a substantial growth in open access publications during the 2020–2023 period, particularly in STEM disciplines and concentrated among a few major publishers. Although this trend is positive for the accessibility of research outputs, it necessarily calls for careful evaluation of the associated costs.

The trends outlined in the report are clear: a sharp increase in open access spending, continuous growth in APC costs, a resurgence of hybrid open access over gold open access, a recovery by Elsevier, IEEE, Springer Nature and Wiley, early signs of decline for MDPI and the emergence of read-and-publish agreements as a new and more expensive model of engagement between publishers and institutions.

All evidence points to a scholarly publishing system increasingly concentrated in the hands of the usual key players, who appear capable of adapting to any change or, more likely, leading it. The open access mandates imposed by funding bodies paradoxically support this trend in the absence of a viable alternative system.

Unimore spent €2.6 million in 2023 alone across standard contracts, read-and-publish agreements and APCs. Are these funds well spent? Or are such resources diverted from research that could have been allocated to other activities and assets? Is it possible to explore, promote and adopt alternative modes of open access publishing and/or negotiate more favourable terms with publishers?

We do not claim to have the answer. The purpose of this report is to provide a robust data foundation to enable informed evaluation by the relevant stakeholders.