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Open access publishing in Vietnam's engineering and technology sector: trends and key funding sources

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Abstract

Background: Over the past decade, open access (OA) publishing has gained increasing prominence in higher education systems worldwide. In Vietnam, this shift has been particularly visible within engineering and technology (E&T) universities, in which the requirement that students publish in international journals and the availability of funding have become central to research evaluation. Understanding how OA publishing has evolved and how funding patterns support this development is essential to assessing changes in research dissemination within the academic sector.

Objectives: This study aimed to (1) analyse the growth of OA publications in Vietnamese E&T universities between 2013 and 2024 in relation to national policy reforms on international publication requirements, (2) identify the predominant OA publishing models, and (3) analyse patterns in funding sources that support OA publications and implications of these funding sources for researchers' choices of outlets for publishing.

Methods: A bibliometric analysis was conducted using publication data retrieved from the Scopus database from 2013 to 2024. The study assessed the distribution of OA publications, the relative prevalence of different models of OA (Gold, Green, etc.) and the extent of funding support for OA articles.

Results: Open access publishing remained modest before 2017 but increased sharply after 2018, coinciding with the introduction of stricter requirements for publishing internationally for doctoral training, eligibility for being a research supervisor, and career advancement. Gold OA emerged as the dominant publishing model in the later years of the study period. Nearly two-thirds (63.3%) of OA publications acknowledged financial support, with domestic public agencies, particularly the National Foundation for Science and Technology Development (NAFOSTED) and the Ministry of Education and Training (MOET), forming the primary funding base, complemented by international collaborative sponsors.

Conclusions: Open access publishing is becoming the norm in Vietnam's E&T universities more because of policies and funding than because of isolated individual initiatives. The growing prominence of Gold OA reflects the interaction between policy-driven incentives, institutional strategies, and the availability of funding. These findings highlight the importance of sustaining and strategically aligning funding mechanisms to support OA publishing in research systems in developing countries.

Keywords:

Bibliometrics, funding for research, open access publishing, Vietnam

Introduction

Open access (OA) publishing enables unrestricted access to scholarly outputs through digital technologies while maintaining peer-review and editorial quality standards.¹ As a core element of open science, OA promotes knowledge dissemination and research transparency, particularly benefiting researchers in developing countries in which access to subscription-based resources is limited.² Consequently, OA publishing has been recognized as an important mechanism for reducing global inequalities in accessing knowledge.^{3,4}

Empirical studies indicate generally positive attitudes towards OA among researchers in the developing regions; however, article processing charges (APCs) remain a significant barrier. Surveys of researchers participating in the AuthorAID initiative and of universities across Nigeria, Kenya, and South Africa show high levels of engagement with OA publications alongside persistent financial constraints related to APCs.⁵

In Vietnam, scholarly engagement with OA has increased steadily, as reflected in the rising number of publications and the rising share of OA publications in that output. An open database of research outputs produced by Vietnamese scholars in the social sciences and humanities was developed using reports from scientists and open online sources, cross-referenced to the Scopus database, for the period 2008–2018. The database contained records of 657 researchers who collectively published 1289 OA papers in Scopus-indexed journals during this period.⁶ A subsequent statistical analysis of Scopus-indexed publications from 2016 to 2021 showed that the share of OA publications increased from 25% in 2011 to 33% in 2016 and reached 43% in 2021.⁷ Despite this progress, several barriers continue to limit the broader

adoption of OA publishing. Foremost among them are APCs, a substantial fee that authors are often required to pay to publish in OA journals. In addition, ongoing scepticism regarding the quality of some OA outlets may further constrain their uptake.

The above studies provide valuable evidence of the overall growth in OA publications authored by Vietnamese scholars. However, these studies either examine OA outputs on a broad national scale across all disciplines or focus primarily on the social sciences and humanities. Consequently, there is still insufficient empirical insight into discipline-specific publishing practices or into the funding pathways that enable OA publication.

The engineering and technology (E&T) sector warrants particular attention in this regard because E&T universities account for a substantial share of Vietnam's internationally indexed research output and play a central role in advancing science, innovation, and national development. Yet empirical evidence on OA publishing models and funding sources within this sector remains scarce.

Accordingly, this study examined international publication patterns in Vietnam's E&T sector, with a focus on the uptake of OA journals as publication avenues and the funding sources that support OA publishing. By studying these aspects, the study contributes discipline-specific evidence to ongoing discussions on OA adoption and research funding in the development of research systems.

The study addressed the following research questions:

RQ1. How did OA publishing in E&T universities in Vietnam evolve between 2013 and 2024, and to what extent was the evolution linked to national policy reforms that made publishing in international journals a requirement?

RQ2. How have funding sources supporting OA publications in Vietnam's E&T universities changed over time, and what do these changes reveal about the interaction between policy-driven incentives, institutional strategies, and researchers' choices of OA publishing models?

Methods

Data source and collection

The present study took a bibliometric approach, using publication data retrieved from the Scopus database, selected for its extensive coverage and reliable indexing of scholarly outputs across STEM (science, technology, engineering, mathematics) disciplines.^{8,9} Scopus provides the structured metadata required for analysis, including document types, subject areas, funding information, and OA indicators.

Data were collected in May 2025 using a pre-defined search criterion covering the period 2013–2024, corresponding to the period following the adoption of Resolution No. 29-NQ/TW on the fundamental and comprehensive reform of education and training in Vietnam.¹⁰ Filters included journal articles published in English, subject area, publication type, funding sponsor, and author affiliation with Vietnamese universities specializing in E&T. The retrieved records were exported to Excel for further analysis.

Selection of universities and subject area

Vietnamese E&T universities were identified from the list of higher education institutions issued by the Ministry of Education and Training (MOET).¹¹ Institutions offering at least one of the five E&T disciplinary groups defined by MOET, namely Life Sciences, Computer and Information Technology, Engineering Technology, Engineering, and Architecture and Construction, were included

according to the national classification regulations,¹² resulting in a final sample of 27 universities.

Academic programmes were mapped to nine corresponding Scopus subject areas: Agricultural and Biological Sciences; Biochemistry, Genetics and Molecular Biology; Chemical Engineering; Computer Science; Earth and Planetary Sciences; Energy; Engineering; Environmental Science; and Materials Science. Publications only within these categories were analysed.

Open access model and data cleaning

Open access status was identified using the "Open Access" flag and "Open Access type" fields in Scopus, which classify publications as Gold, Hybrid, Green, or Bronze OA. As Scopus does not distinguish Diamond OA as a separate category, it was not included as a distinct category in the analysis.

Data cleaning involved consolidating data sets from all universities, removing duplicate records due to multiple affiliations, and standardizing OA models and funding information to ensure a consistent data set.

Ethical considerations

The present study used publicly available bibliographic data from the Scopus database and did not involve human participants, personal data, or confidential information. Therefore, institutional ethical approval was not required. The research followed accepted ethical standards for bibliometric and scientometric studies and complied with the responsible use of indexed databases.

Results and discussion

After completing the data-cleaning procedures, including the removal of 2412 duplicate records generated by multi-affiliated authors, the final data set comprised 22,130

unique publications, of which 10,294 were classified as OA. Within this corpus, 6515 publications included funding acknowledgements, corresponding to 2708 distinct funding organizations identified during the period 2013–2024. These consolidated data provided the basis for subsequent analyses of trends in OA publishing and funding sources across Vietnamese E&T universities.

Trends in open access publications among engineering and technology universities in Vietnam

Table 1 shows the growth trends of total and OA publications from 2013 to 2024. During this period, the total number of publications increased 9.46 times, from 385 articles in 2013 to 3644 in 2024. Meanwhile, OA publications grew more rapidly, increasing 21.94 times from 85 articles in 2013 to 1810 in 2024.

The trend of OA publishing was divided into two phases: the first phase from 2013 to 2017 and the second phase from 2018 to 2024.

The split is analytically grounded in major national policy reforms introduced around 2017/18 within Vietnam's higher education

and research system. These reforms imposed more stringent requirements for doctoral supervision, doctoral training, and career advancement, with explicit emphasis on publications indexed in the Web of Science and Scopus.^{13–18} Consequently, international publishing – and, by extension, OA publishing – shifted from a largely discretionary individual decision to a structural requirement embedded within research-oriented reforms in higher education, accountability mechanisms, and policies favouring internationalization and implemented across Vietnam's higher education system.¹⁹ Anchoring the study period in this policy context allows for a more nuanced interpretation of the observed growth dynamics and helps to explain the divergence between OA trajectories in Vietnam's E&T universities and institutions in the rest of the world.

(1) Period 2013–2017: slow growth and low adoption of open access

During 2013–2017, both the total number of publications and the number of OA publications remained modest; the total increased gradually from 385 to 1005 and OA

Table 1. Total publications and those in open access journals from 27 engineering and technology universities in Vietnam, 2013–2024

Year	Total number of publications	Number of publications in OA journals	Share of OA (%)	Average annual growth rate of OA (%)
2013	385	85	22.08	N/A
2014	493	125	25.35	47.06
2015	549	143	26.05	14.40
2016	797	226	28.36	58.04
2017	1005	299	29.75	32.30
2018	1250	460	36.80	53.85
2019	1839	870	47.31	89.13
2020	2632	1315	49.96	51.15
2021	3003	1530	50.95	16.35
2022	3230	1634	50.59	6.80
2023	3303	1796	54.37	9.91
2024	3644	1810	49.67	0.78
Total	22,130	10,293	Average 46.51	34.52

E&T, engineering and technology; OA, open access.

publications, from 85 to 299. The share of the latter stayed consistently below 30%.

(2) Period 2018–2024: rapid expansion and mainstreaming of open access

The period 2018–2024 represents a clear structural transition marked by rapid expansion in OA publications: that output increased from 460 articles in 2018 to 1810 in 2024, exceeding 50% of the total publications between 2020 and 2023 and signalling the institutionalization of OA practices. Notably, this period accounted for 91.47% of all OA publications produced during 2013–2024.

Overall, OA publications from across the 27 E&T universities grew at a compound annual growth rate (CAGR) of 34.52%, although growth dynamics differed between periods. The higher CAGR observed in 2013–2017 (37.95%) largely reflects a low initial publication base and relatively limited absolute output, whereas the slightly lower rate in 2018–2024 (33.57%) occurred alongside substantial expansion of publications, averaging more than 1300 articles annually and

reaching 1500–1800 articles between 2021 and 2024. This pattern indicates a transition from an early-stage proportional expansion to a phase of consolidation in which OA publishing matured and stabilized at a substantially higher production level.

Figure 1 highlights the substantial expansion of OA publishing among Vietnam's E&T universities over the period 2013–2024, with output growth accelerating markedly after 2018. Gold OA emerged as the dominant publication model (CAGR 46.67%), indicating a structural transition from repository-based dissemination towards publisher-mediated OA models. Although Green OA played a leading role during the early years, its relative contribution declined in later periods (CAGR 24.17%), suggesting changing institutional or funding dynamics influencing publication strategies. Hybrid OA demonstrated steady growth (CAGR 29.35%), whereas Bronze OA remained comparatively limited and unstable (CAGR 16.58%). Notably, OA publishing became strongly concentrated in the 2018–2024 period, accounting for 94.60%

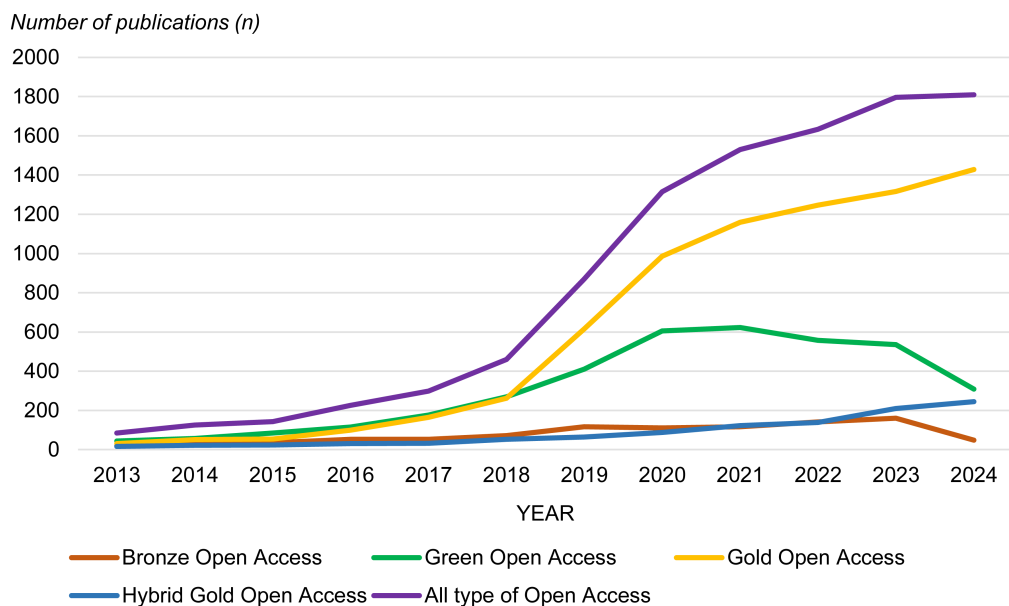


Figure 1. Annual number of publications from engineering and technology universities in Vietnam by OA type, 2013–2024. Note: A single publication may be classified under multiple categories.

of Gold OA, 87.40% of Green OA, 88.03% of Hybrid OA, and 79.87% of Bronze OA outputs recorded during 2013–2024. Overall, these patterns indicate a clear post-2018 consolidation of OA within Vietnam's E&T research system.

A comparison of OA publishing trends among the 27 Vietnamese E&T universities with global patterns from 2013 to 2024 across nine Scopus-defined subject areas revealed both convergence and divergence in the scale and trajectory of OA. Overall, Vietnam's performance was consistent with – and in some respects exceeded – global growth in OA, with the share of OA of 46.51% in Vietnam compared to the global average of 43.68%. Notably, during 2020–2024, OA publishing surpassed the threshold of 50% for Vietnam and the world.

However, the scale and pace of expansion of OA among Vietnamese E&T universities differed markedly from global patterns. In 2013, their OA share was below 30%, lower than the global average, but increased rapidly after 2020, surpassing 50% and attaining the global OA level. Scopus data indicate that global growth in OA followed a steady trajectory, taking approximately 8 years (2013–2021) to increase from 30% to 50%. In contrast, the 27 E&T universities required only 4 years (2014–2017) to increase their share from 20% to 30%, after which the growth accelerated, the share rising from 36% to 50% within 3 years. Overall, the CAGR of OA of these universities was nearly 3 times higher than the CAGR of global OA.

As with the pattern of distribution of different models of OA, the evolution of OA modalities among the 27 Vietnamese E&T universities largely reflects global trends, particularly the reversal of dominance between Gold OA and Green OA: Green OA dominated during the early years but declined towards the end of the study period, when Gold OA emerged

as the leading model and demonstrated the fastest growth. Although Hybrid Gold OA was not the dominant choice among publishing models, it showed the most stable growth over time.

Some key differences appear in the growth dynamics of different types of OA. Green OA expanded more rapidly in the early period among Vietnamese E&T universities whereas, after 2018, it was Gold OA that increased sharply to become dominant and Bronze OA grew steadily. Globally, however, Green OA remained the leading type until 2021 despite the eventual rise of Gold OA. Bronze OA was relatively stable for much of the period before declining towards the end, with the output falling to roughly a third to a half of its initial level.

A further distinction is evident in the total number of OA articles by their OA model. For the 27 E&T universities, Gold OA is the leading model, the numbers being two to seven times greater than those for other models of OA, whereas Hybrid Gold OA accounts for the smallest share. Globally, Green OA is the dominant model, accounting for one to five times the number of articles as those for the other models, and Bronze OA accounts for the smallest share.

These differences are further evident in the overall scale of growth. Between 2013 and 2024, all OA models for the 27 E&T universities expanded substantially: Gold OA increased more than fortyfold; Green OA, sevenfold; Bronze OA, eightfold; and Hybrid Gold OA, fifteenfold. By contrast, global growth was markedly more moderate. Over the same period, Gold OA increased just over sixfold, Green OA doubled, Bronze OA declined to two-thirds of its initial volume, and Hybrid Gold OA grew fivefold.

A key factor explaining Vietnam's divergence from global trends is the substantial reform of its higher education and research system.

National regulations introduced between 2017 and 2021 strengthened requirements for doctoral recruitment, training, and supervision. Academics were required to have at least one Web of Science- or Scopus-indexed publication to qualify as supervisors, and doctoral candidates were required to publish as the lead author in at least one indexed journal and undergo a professional review before thesis evaluation.^{13,14} In addition, the criteria for promotion included lead-authored publications in reputable international journals, requiring at least five articles for being promoted as a professor and three as an associate professor.^{15–17} These policies have significantly stimulated publications in international journals across Vietnamese universities, particularly within the E&T sector.

Furthermore, the rising number of OA articles is also due to the increased interest from research administrators and the changing views of researchers themselves. As national authorities have gained a better understanding of the advantages of open science and OA publishing, this has been incorporated into national strategies and plans for research and technological development.^{20,21} These findings indicate that national reforms have driven a structural shift that is fundamentally reshaping research activities within Vietnam's higher education system, particularly among its E&T universities.

In addition, extensive international collaboration within the E&T sector increases exposure to funder-driven open access mandates from major agencies such as Horizon Europe and the US National Institutes of Health, which require funded research outputs to be openly accessible, and accelerates the choice of Gold OA as the favoured model.^{22–24} Collectively, these findings suggest that although the trends for Vietnamese E&T institutions align with global trends in open dissemination, their pace of expansion is considerably faster,

accompanied by a more pronounced shift towards Gold OA. The combined influence of domestic policy reforms and international funding mandates has accelerated the transition to OA, making it both earlier and more robust than global patterns and positioning Vietnam on a distinctive trajectory within the broader OA landscape.

The evolution of OA publishing in Vietnam's E&T universities between 2013 and 2024 reflects a policy-driven transformation rather than purely organic growth. The shift from modest OA adoption before 2017 to its rapid expansion and mainstreaming after 2018 closely aligns with national policy reforms that strengthened the requirements that researchers publish in international journals.^{13–17} These reforms effectively repositioned international and increasingly OA publishing from a discretionary activity to a structural component of academic evaluation within Vietnam's higher education system.^{18,19}

This connection with policy helps to explain both the timing and the intensity of growth in OA publishing, particularly the pronounced post-2018 expansion of Gold OA. Universities and researchers appear to have responded strategically to these regulatory incentives by prioritizing publication choices that ensure compliance while enhancing visibility and international reach, consistent with evidence showing that policy and funder mandates substantially influence OA adoption and publishing behaviour.²⁴ The resulting OA trajectory diverges from global patterns, illustrating how national governance frameworks can accelerate a systemic change in scholarly communication.^{18,19} Overall, the findings indicate that the evolution of OA publishing in Vietnam's E&T sector is closely associated with policy reforms related to the requirements that academics publish internationally.

An examination of the OA journals most frequently chosen by researchers from the 27 E&T universities (Table 2) reveals a clear inclination towards publications specializing in applied engineering and materials science, with multidisciplinary OA journals such as *IEEE Access*, *Applied Sciences*, and *ACS Omega* being particularly prominent. This pattern reflects both the disciplinary orientation of these institutions and a pragmatic publication strategy, whereby researchers favour journals that offer broad thematic coverage, relatively rapid review and short publication cycles, and strong international visibility.

The simultaneous presence of high-quartile (Q1–Q2) and low-quartile (Q3–Q4) journals in the list of journals further suggests a dual-track approach to dissemination. High-quartile journals are chosen to enhance international recognition and citation impact, whereas regional or lower-quartile outlets continue to serve as important channels for rapid dissemination, context-specific research communication, and adherence to institutional or national evaluation requirements. Collectively, these dynamics help elucidate the pronounced shift towards Gold OA during 2018–2024 as funder mandates, national policy reforms, and the growing availability

Table 2. Top 10 open access journals most frequently chosen by 27 engineering and technology universities in Vietnam

Rank	Journal	No. of publications	Subject area	Quartile ranking (2024)	Country
1	<i>IEEE Access</i>	288	Computer Science Engineering Materials Science	Q1	United States
2	<i>Applied Sciences Switzerland</i>	215	Computer Science Engineering Materials Science Chemical Engineering Physics and Astronomy	Q2	Switzerland
3	<i>RSC Advances</i>	206	Chemical Engineering Chemical	Q1	United Kingdom
4	<i>Sustainability Switzerland</i>	205	Computer Science Energy Environmental Science Social Sciences	Q1	Switzerland
5	<i>Engineering, Technology and Applied Science Research</i>	184	Computer Science Engineering Materials Science	Q2	Greece
6	<i>Vietnam Journal of Science and Technology</i>	158	Chemical Engineering Environmental Science Materials Science	Q4	Vietnam
7	<i>Inzynieria Mineralna</i>	114	Earth and Planetary Sciences Sciences	Q3	Poland
8	<i>Natural Product Communications</i>	113	Agricultural and Biological Sciences Medicine Pharmacology, Toxicology and Pharmaceutics	Q3	United States
9	<i>Energies</i>	106	Energy Engineering Mathematics	Q1	Switzerland
10	<i>ACS Omega</i>	90	Chemical Engineering Chemistry	Q1	United States

of multidisciplinary OA journals have jointly accelerated the transition towards international OA publishing among Vietnam's E&T researchers.^{22–24}

Cross-university comparisons

Table 3 highlights substantial disparities in performance among Vietnam's E&T universities, reflecting differences in institutional research capacity and publishing orientation. Universities demonstrating strong overall research output – typically those supported by large academic and research staff – also tend to be more productive, as illustrated by

research-intensive institutions such as Ha Noi University of Science and Technology and Can Tho University. This pattern suggests a close association between institutional scale and sustained OA publishing. Nevertheless, institutional size alone does not fully explain OA engagement: several medium or small universities, including Tay Nguyen University and Ho Chi Minh City Open University, report that publications in OA journals account for more than half of their total publications, indicating that organizational priorities and collaboration practices may significantly influence OA adoption. Notably,

Table 3. Engineering and technology universities in Vietnam ranked by the number of publications

Rank	University	All publications	OA publications	Share of OA (%)
1	Ha Noi University of Science and Technology	4457	1822	40.88
2	Can Tho University	2824	1497	53.01
3	Hue University	1894	940	49.63
4	The University of Danang	1788	816	45.64
5	Thai Nguyen University	1487	720	48.42
6	HCMC University of Technology and Education	1204	595	49.42
7	Vinh University	1131	522	46.15
8	Ha Noi University of Mining and Geology	1058	528	49.91
9	Hanoi National University of Education	974	385	39.53
10	Hanoi University of Civil Engineering	875	386	44.11
11	University of Transport and Communications	820	413	50.37
12	Ho Chi Minh City Open University	731	371	50.75
13	University of Agriculture and Forestry Ho Chi Minh City	721	332	46.05
14	Nha Trang University	691	321	46.45
15	University of Economics Ho Chi Minh City	556	246	44.24
16	Hung Yen University of Technology and Education	393	143	36.39
17	Quy Nhon University	381	184	48.29
18	Ho Chi Minh City University of Education	364	142	39.01
19	Dong Thap University	349	130	37.25
20	National Economics University	332	178	53.61
21	Tay Nguyen University	332	205	61.75
22	Da Lat University	314	114	36.31
23	Vietnamese–German University	299	118	39.46
24	Hanoi Pedagogical University 2	248	95	38.31
25	Tay Bac University	143	52	36.36
26	Kien Giang University	119	60	50.42
27	Ha Noi Open University	57	41	71.93

OA, open access.

Ha Noi Open University records the highest share of OA publications despite its limited number of total publications.

The distribution of OA publications across the 27 E&T universities indicates not only clear differences in research capacity but also the evolving institutional approaches to scholarly communication. The output in OA journals appears to be shaped not only by staff size and established research intensity but also by how individual universities engage with the broader shift towards open science, consistent with evidence showing substantial institutional variation in the choice of OA across higher education systems worldwide.²⁵ Several institutions with moderate publication volumes demonstrate a strong preference for OA, implying that OA is being used strategically to enhance research visibility despite more limited overall output, in line with findings that OA publishing increases both reach and scholarly visibility.²⁴

A notable observation is that high OA publishing rates are not limited to the largest or most research-active universities. That several smaller institutions have more than half of their publications in OA journals suggests that OA practices are gradually becoming standard across the sector. Although variation exists, shares of OA appear broadly comparable across institutions of differing sizes, indicating that adoption may increasingly be influenced by institutional policies, researcher awareness, and participation in international scholarly networks rather than structural capacity alone, a trend also observed in studies examining policy- and collaboration-driven OA adoption patterns.¹⁸

Overall, these findings suggest that OA publishing is becoming increasingly common within Vietnam's E&T universities. This popularity of OA offers a useful basis for national policies aimed at strengthening open science, improving the visibility of Vietnamese

research, and supporting more equitable participation in international scholarship, consistent with global developments towards research systems oriented to open science.¹ Continued attention to institutional strategies and researcher support will be essential as Vietnam seeks to align its research system with global open science frameworks.

Funding sources

Analysing the publications during the period 2013–2024 shows that 6515 of 10,293 OA publications (63.30%) received financial support from both domestic and international funding sources (Figure 2). A total of 2708 sources funded OA publications during the period. Funded outputs increased significantly from 2019, and since 2021, annual OA publications receiving financial support have exceeded 1000, reflecting stronger funding support despite recent fluctuations in growth.

The distribution of major funding organizations presented in Table 4 indicates that OA publishing in Vietnam's E&T universities is predominantly sustained by domestic funding agencies. This pattern aligns with broader trends observed in the research systems of many developing countries, in which national public funding remains the primary driver of the development of scientific capacity.²⁶ The National Foundation for Science and Technology Development (NAFOSTED) and MOET stand out as the top public agencies supporting OA publishing. Their prominence highlights the Vietnamese government's strategic focus on educational progress and its investment in scientific and technological growth through public funding.²⁷ The inclusion of higher education institutions and research institutes among the leading domestic funders further reflects the strength of Vietnam's internal research ecosystem. Notably, the only private-sector organization in this group, Vingroup Joint Stock Company, has contributed significantly through its

No. of publications and of funders

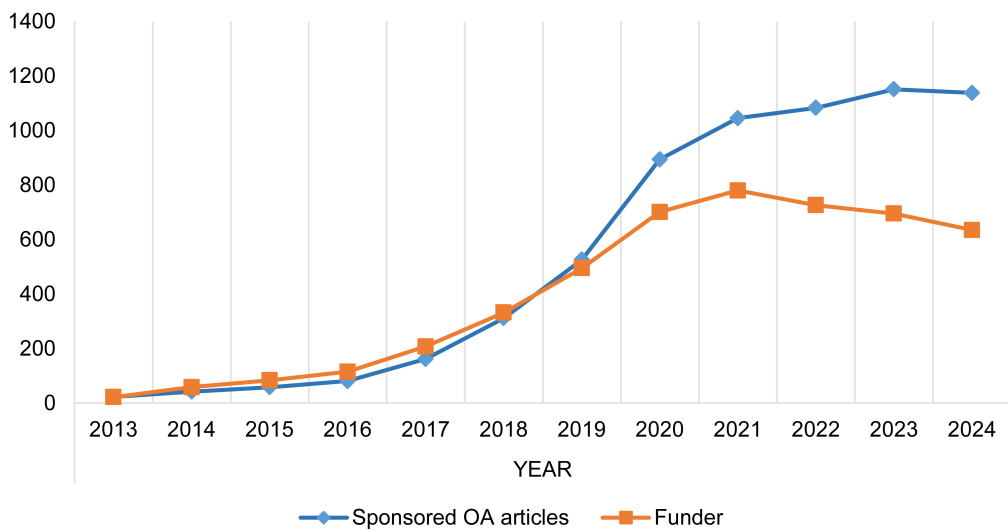


Figure 2. Number of funded publications from engineering and technology universities in Vietnam and number of funders, 2013–2024. Note: A single publication may receive funding from multiple sponsors, and a single sponsor may fund multiple publications and/or across multiple years.

affiliated university, research institutes, and the Vingroup Innovation Foundation. This pattern illustrates an increasing trend of public–private collaboration in Vietnam’s research scene, reflecting a shared commitment by both government and private entities to fostering sustainable scientific output, especially in high-impact fields such as E&T, which are closely tied to the country’s economic growth and innovation capacity.

However, domestic funding organizations are yet to establish clear policies or dedicated funding mechanisms for developing OA publications. These organizations should consider adopting principles similar to Plan S,²⁸ which creates dedicated funds to cover APCs and requires that all scholarly outputs from publicly or privately funded research, whether through national, regional, or international agencies, be published in OA journals, on OA platforms, or be immediately accessible through OA repositories without embargo. In this context, the MOET, or a consortium of Vietnamese universities, could

negotiate transformative OA agreements with major publishers such as Elsevier, Springer Nature, and Wiley. Such agreements convert institutional subscription expenditures into funding mechanisms that support OA publication and enable wider public dissemination of peer-reviewed research outputs.²⁹ This approach, inspired by the DEAL Consortium (formerly Projekt DEAL) model implemented in Germany,³⁰ can lower the overall cost of scholarly communication, increase the visibility and impact of Vietnamese research, and significantly expand global access to knowledge.

Additionally, funding agencies that allocate public resources, such as MOET or NAFOSTED, should implement policies requiring all grant recipients to deposit an electronic copy of their accepted manuscripts in a repository managed by the ministry or the funding agency and make the copies publicly accessible upon publication, following the example set by the National Institutes of Health.³¹ Only when funding policies balance

Table 4. Top 10 domestic and international organizations funding publication in open access journals from 27 engineering and technology universities in Vietnam

Rank	Vietnamese funder	No. of publications	Proportion of OA (%)	Rank	International funder	No. of publications	Proportion of OA (%)
1	MOET	826	8.02	1	National Science and Technology Council, Taiwan	288	2.80
2	NAFOSTED	822	7.99	2	National Research Foundation of Korea, South Korea	266	2.58
3	Vietnam Academy of Science and Technology	237	2.30	3	European Commission, EU	256	2.49
4	Hue University	233	2.26	4	Japan Society for the Promotion of Science, Japan	254	2.47
5	Vingroup joint stock company	229	2.22	5	Ministry of Science and ICT, South Korea	165	1.60
6	Hanoi University of Science and Technology	227	2.21	6	UK Research and Innovation, United Kingdom	107	1.04
7	Thai Nguyen University	159	1.54	7	Oregon Department of Agriculture, United States	106	1.03
8	The University of Da Nang	157	1.53	8	National Natural Science Foundation of China, China	94	0.91
9	Viet Nam National University, Ho Chi Minh City	133	1.29	9	Anhui University of Science and Technology, China	84	0.82
10	University of Economics, Ho Chi Minh City	121	1.18	10	National Science Foundation, United States	78	0.76

MOET, Ministry of Education and Training; NAFOSTED, National Foundation for Science and Technology Development; OA, open access.

mandates with incentives can Vietnam sustainably grow its financial support for OA publishing and boost the number of OA articles indexed in Scopus and other international databases.

International funding organizations play a complementary role in supporting OA publications, primarily facilitating collaborative research networks rather than acting as dominant financial sources. This pattern

reflects Vietnam's increasing integration into regional and global research networks,³² while also highlighting the continued importance of domestic public funding as a foundational driver of national research development.²⁷ The relatively limited participation of international funding agencies may be due to the constrained collaborative networks between Vietnamese E&T universities and global funding bodies, as well as challenges in accessing competitive foreign funding programmes. Expanding engagement with diverse international funding sources through comprehensive internationalization strategies and strengthened institutional partnerships will therefore be essential for enhancing publication capacity and improving alignment with international scientific standards.

A limitation of this study is that it relies solely on Scopus data and focuses on public E&T universities under the MOET. Future research could expand the scope of the present work to include all MOET-affiliated institutions and incorporate additional data sources, such as the Web of Science, to offer a more comprehensive view of OA publishing in Vietnam's E&T sector.

Conclusions

The present study examined the evolution of OA publishing at Vietnam's E&T universities between 2013 and 2024 with particular attention to the roles of national policy reforms and funding structures.

In response to the first research question, the results show that OA publishing remained modest before 2017 but increased sharply after 2018, consistent with stricter requirements that doctoral students publish internationally and that such publishing is also a condition for being eligible as a research supervisor as well as for promotion to an associate professor or a professor. These

reforms appear to have embedded international – and increasingly OA – publishing within the processes of evaluating researchers, helping to explain both the timing of OA growth and the rising prominence of Gold OA.

In response to the second research question, the results show that the sources of funding to support OA publications evolved alongside this policy context. Nearly two-thirds of OA publications acknowledged financial support, with domestic public agencies forming the dominant funding base and international collaborative sponsors playing a complementary role. This funding pattern reflects an interaction between policy-driven incentives, institutional strategies, and researchers' choices of OA publishing models.

Overall, OA publishing in Vietnam's E&T universities has now become a norm, driven more by a policy- and funding-sensitive environment than by isolated individual decisions. By linking OA trajectories to policy reforms and funding patterns, the present study moves beyond descriptive trend analysis and contributes to a more nuanced understanding of scholarly communication in research systems of developing countries.

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