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ENGINEERING RESEARCH AND SCIENTIFIC CONTRIBUTIONS AT UNIVERSITAS PENDIDIKAN INDONESIA: TRENDS, CHALLENGES, AND FUTURE DIRECTIONS

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Abstract

Engineering research plays a crucial role in technological advancement and scientific innovation, yet many universities struggle to increase publication impact, international collaboration, and research commercialization. Universitas Pendidikan Indonesia (UPI) has made significant progress in engineering research. This study analyses UPI's engineering research trends, citation impact, and global collaborations while identifying strategies to enhance research quality. A bibliometric analysis was conducted to evaluate publication output, citation influence, and researcher recognition. Results show that UPI has increased high-impact publications and improved faculty representation in global rankings. Engineering researchers have been listed among the world's top 2% of scientists, and UPI manages two Scopus-indexed engineering journals that contribute significantly to citation impact, enhancing its global reputation. However, citation rates remain a concern because of the dominance of conference proceedings. Strengthening research funding, fostering interdisciplinary collaborations, and improving commercialization efforts can further enhance UPI's scientific contributions. This study provides actionable recommendations to improve research visibility, benefiting both academia and industry.

Keywords: Bibliometric, Citation impact, Engineering research, International collaboration, Research commercialization.

1. Introduction

Engineering research plays a crucial role in driving technological innovation and scientific advancement. However, challenges such as limited funding, lack of industry-academic collaboration, and difficulty in publishing high-impact research continue to hinder the progress of engineering disciplines, particularly in developing countries. Many universities struggle to produce research that is both academically rigorous and practically applicable, leading to a gap between theoretical advancements and industrial needs. Moreover, while engineering research has expanded globally, its impact is often measured through publication volume rather than real-world applications and citations, raising concerns about the quality and relevance of scientific output [1].

Universitas Pendidikan Indonesia (UPI) has emerged as a significant contributor to engineering research, with a growing number of publications in Scopus and Web of Science (WoS)-indexed journals. Recent studies have reviewed the publication trends, citation impact, and international collaborations at UPI and Indonesian institutions [2-9]. However, several gaps remain in current research and review studies. Previous analyses have focused primarily on publication quantity, rather than the quality and long-term impact of engineering research. Additionally, few studies have examined the relationship between international collaborations and research citations, making it difficult to determine whether UPI's global partnerships contribute to higher citation rates. Furthermore, little attention has been given to research commercialization, despite its importance in bridging the gap between academia and industry.

This study aims to address these limitations by providing a comprehensive analysis of UPI's engineering research output, focusing on publication trends, citation impact, international collaborations, and research commercialization. It also evaluates the role of engineering research in scientific advancements and institutional reputation, while proposing strategies to improve research impact and visibility. Unlike previous studies, this research not only quantifies engineering publications at UPI but also investigates the factors influencing research quality, citation performance, and international recognition.

The novelty of this study lies in its integrated approach to assessing engineering research performance, combining bibliometric analysis, citation impact evaluation, and research commercialization trends. By identifying key challenges and proposing solutions, this research provides a strategic roadmap for UPI to enhance its research quality, increase high-impact journal publications, and strengthen its global academic presence. The findings are expected to contribute to policy recommendations for improving engineering research at UPI while serving as a reference for other institutions aiming to boost their scientific output and international collaborations.

The impact of this study extends beyond academic rankings, as it provides practical insights into strengthening research ecosystems. By addressing the barriers to high-quality publications, fostering stronger international collaborations, and encouraging research commercialization, UPI can position itself as a leader in engineering innovation and knowledge dissemination. This research ultimately contributes to the broader goal of advancing engineering education and technological development in Indonesia and beyond.

2. Method

This study analysed the impact of the engineering subject area on research, innovation, and scientific publications at UPI over the past five years (2020–2025). The methodology included data collection, data analysis, and the interpretation of trends in scientific publications, with a focus on engineering-related research. The data for this study were obtained from the Scopus database, where the number and trends of engineering-related publications at UPI from 2020 to 2025 were extracted on 17 March 2025. Additional data were collected from UPI's internal publication records, including information on journals managed by UPI, their accreditation levels, and subject areas. Furthermore, university reports and policies related to research and innovation were reviewed to understand the strategies implemented to enhance publication output. Citation impact and journal indexing data were gathered from Scopus-indexed journals and citation reports to evaluate the influence of engineering-related research. Detailed information on how to get this data is explained elsewhere [10-12].

The collected data were analysed to identify publication trends, fluctuations, and factors affecting research productivity in the engineering field. A comparative analysis was conducted to assess the contribution of engineering publications relative to other subject areas at UPI. Citation impact and journal indexing status were examined to determine the influence of engineering research within the academic community. Collaboration patterns were evaluated by analysing co-authored papers involving international institutions. Additionally, a qualitative analysis was performed on reports and policies to identify challenges and strategies for improving engineering research and innovation at UPI.

This study focused exclusively on engineering-related publications at UPI within the 2020 to 2025 timeframe. The analysis was limited to Scopus-indexed publications and institutional records, excluding non-indexed publications and unpublished research reports. Furthermore, citation impact may have been influenced by external factors such as journal policies and international research trends.

3. Results and Discussion

3.1. Publication trends at UPI (2020-2025)

The publication trends at UPI from 2020 to 2025 exhibit fluctuations in research output, as shown in Fig. 1. Over these five years, UPI's Scopus-indexed publications reached their highest number in 2020, followed by a decline in 2021 and 2022, a partial recovery in 2023 and 2024, and an initial drop in 2025. These variations are influenced by institutional policies, global academic trends, and external factors such as the COVID-19 pandemic.

A visual representation of this trend is provided in Fig. 1, which illustrates the significant variations in UPI's research productivity. The curve highlights a peak in 2020, a decline in 2021–2022, a recovery phase in 2023-2024, and a sharp decrease in 2025. Despite the high publication output in 2020 with 1,080 documents, a downward trend was observed in the subsequent years, with publications dropping to 922 in 2021 and 796 in 2022. This decline may have been caused by changes in journal policies, increased competition in high-impact journals, and disruptions in research activities during the COVID-19 pandemic. In 2023, UPI's publication output showed signs of recovery, increasing to 916,

followed by 948 publications in 2024. The rise in research output can be attributed to institutional efforts such as publication incentives, faculty development programs, and enhanced academic collaborations. A significant drop was observed in 2025, with only 176 publications recorded as of March 17. However, this number does not represent the final count, as many publications may still be in the indexing process. The sharp decline could be due to delays in journal indexing, evolving research policies, or shifts in publication platforms. A final assessment at the end of 2025 is required to determine the actual research output. The fluctuating trends in publication output emphasize the need for continuous monitoring and strategic planning to sustain research productivity. UPI's Journal and Publication Office (known as Kantor Jurnal dan Publikasi UPI) plays a vital role in tracking publication trends and implementing strategies to enhance academic output. Strengthening research collaborations, increasing research funding, and ensuring compliance with international publication standards are critical for maintaining UPI's position in global research.

The publication trends over the years highlight UPI's resilience in research productivity. However, institutional policies must continuously adapt to global academic dynamics to sustain and improve scientific impact and academic reputation.

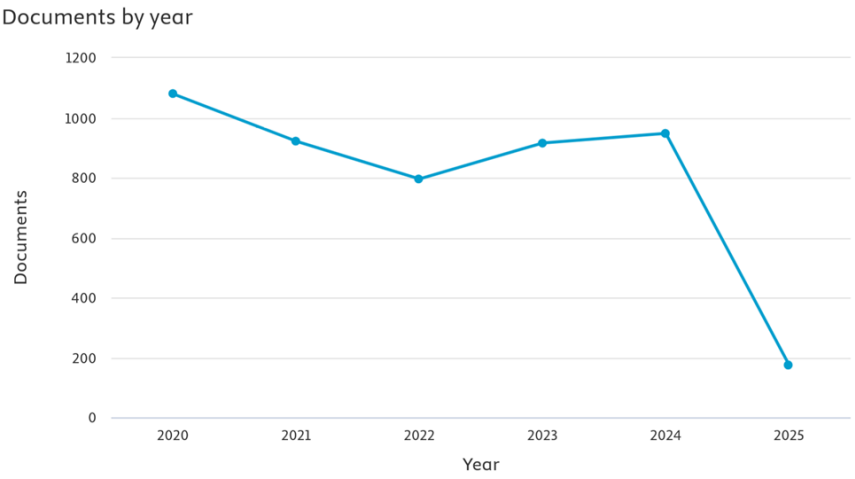


Fig. 1. Publication Trends of UPI (2020-2025). Data sourced from Scopus was retrieved and updated on 17 March 2025.

3.2. International collaboration at UPI

International collaboration plays a significant role in enhancing the quality, visibility, and impact of scientific publications. Figure 2 illustrates the top 10 countries that have collaborated with UPI in research publications. The data indicate that UPI has established global partnerships with researchers from over 100 countries. As shown in Fig. 2, Malaysia is the most prominent international partner, contributing to 470 collaborative publications. This strong research collaboration is likely driven by geographical proximity, shared academic interests, and institutional partnerships. Japan follows with 107 publications, while Australia (79 documents), China (76 documents), and India (66 documents) also represent key research partners. Other notable collaborations include the United Kingdom

(65 documents), South Korea (55 documents), Thailand (50 documents), Taiwan (42 documents), and Saudi Arabia (40 documents).

The geographical distribution of UPI's research collaborations suggests a strong regional focus, with Southeast Asia, East Asia, and Australia being the primary partners. The presence of European collaborators, such as the United Kingdom, also highlights UPI's growing engagement with global research institutions.

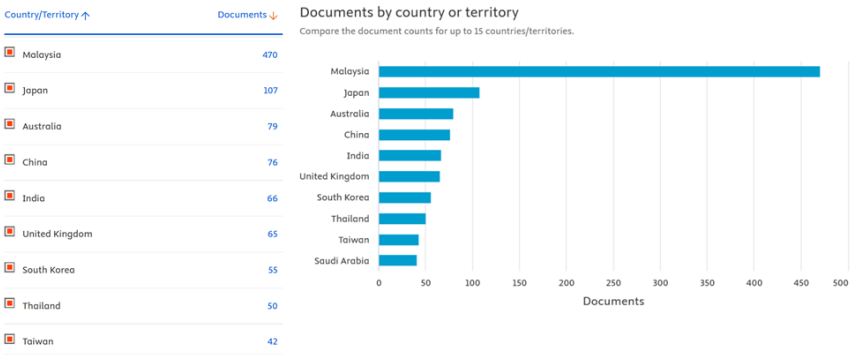


Fig. 2. Top 10 Countries Collaborating with UPI in Scientific Publications. Data was sourced from Scopus, updated, and retrieved on 17 March 2025.

Despite these achievements, several challenges remain in expanding international collaborations. A high reliance on Malaysia for research partnerships may suggest a need for broader diversification across different regions. Additionally, funding limitations, administrative barriers, and language constraints may hinder UPI researchers from establishing stronger collaborations with leading universities worldwide. To further enhance global research partnerships, UPI should implement strategic initiatives such as:

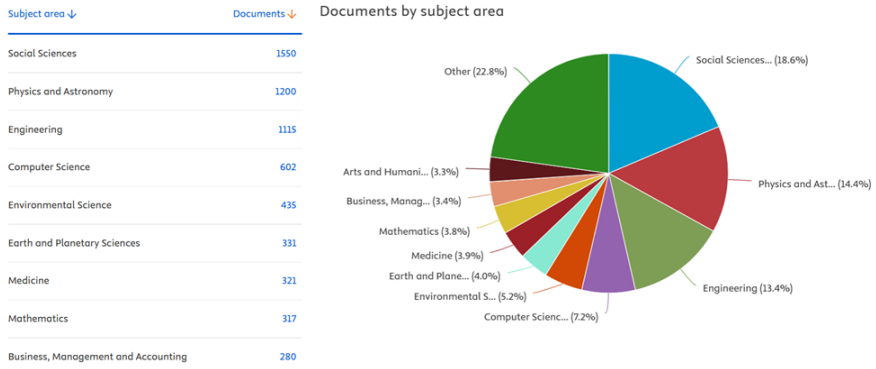
(i) Strengthening institutional agreements with top-ranked universities in North America and Europe.
(ii) Encouraging faculty and student exchange programs to foster long-term research relationships.
(iii) Expanding joint funding applications for international research grants.
(iv) Increasing multidisciplinary research collaborations to align with global trends in engineering, technology, and education.

UPI's increasing engagement in international research collaborations demonstrates its commitment to global academic excellence. However, broadening research networks beyond its primary collaborators will be essential in enhancing the university's scientific impact and global recognition.

3.3. Effect of forebody

The contribution of engineering research to the overall scientific output of UPI plays a crucial role in understanding its research landscape. Figure 3 presents a comparison of publications across different disciplines at UPI, highlighting the relative contribution of engineering research compared to other subject areas. As illustrated in Fig. 3, social sciences account for the highest number of publications (1,550 documents), followed by physics and astronomy (1,200 documents) and

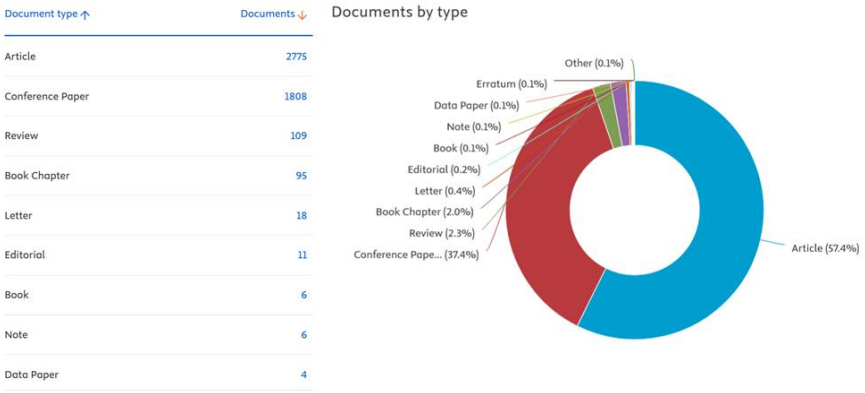
engineering (1,115 documents). The computer science and environmental science disciplines contribute 602 and 435 publications, respectively. Other fields such as earth and planetary sciences, medicine, and mathematics also represent notable portions of UPI's research output.



Subject area	Documents
Social Sciences	1550
Physics and Astronomy	1200
Engineering	1115
Computer Science	602
Environmental Science	435
Earth and Planetary Sciences	331
Medicine	321
Mathematics	317
Business, Management and Accounting	280

Fig. 3. Distribution of Publications by Subject Area at UPI (2020-2025). Data was sourced from Scopus retrieved on 17 March 2025.

Although engineering publications rank among the top three disciplines in terms of research output, they remain behind social sciences and physics. This trend reflects UPI's historical strength in education-related fields while also demonstrating its growing contributions to science, technology, engineering, and mathematics (STEM) research [13].



Document type	Documents
Article	2775
Conference Paper	1808
Review	109
Book Chapter	95
Letter	18
Editorial	11
Book	6
Note	6
Data Paper	4

Fig. 4. Distribution of Publications by Type at UPI (2020–2025). Data was sourced from Scopus and retrieved on 17 March 2025.

Figure 5 presents the publication trends by source and shows how publication patterns have evolved. After 2021, publications in the IOP Conference Series Earth and Environmental Science and Journal of Physics Conference Series declined significantly. However, starting from 2022, there was a notable increase in publications in AIP Conference Proceedings, reaching its peak in 2023 before experiencing another decline in 2024. This shift indicates a transition in

publication trends toward proceedings that are more relevant to engineering and physical sciences.

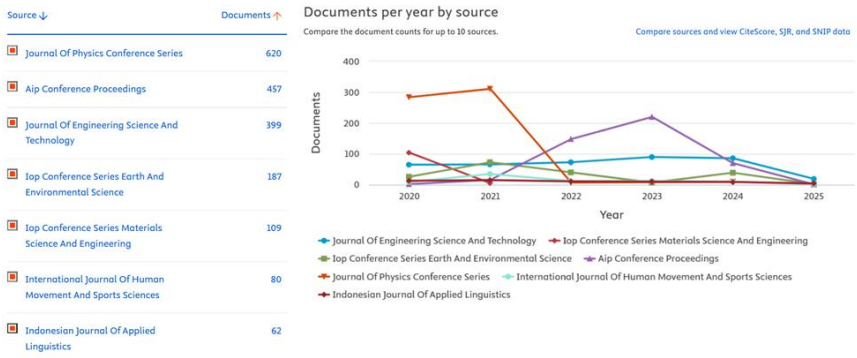


Fig. 5. Documents by Year and Source of Publication. Data was sourced from Scopus and retrieved on 17 March 2025.

Despite the steady growth of engineering research at UPI, some challenges hinder further expansion:

(i) Lower research funding allocation compared to social sciences and physics. This is because engineering needs more cost compared to other disciplines.
(ii) Limited interdisciplinary collaboration, particularly in applied engineering fields.
(iii) The need for increased publication in high-impact Scopus-indexed engineering journals.
(iv) A relatively smaller number of faculty members in engineering disciplines compared to education and social sciences.

To enhance engineering research visibility, UPI should focus on several aspects [14]:

(i) Expanding research funding opportunities for engineering and applied sciences.
(ii) Strengthening collaborations with industry and international institutions.
(iii) Increasing participation in multidisciplinary research projects.
(iv) Encouraging engineering faculty members to publish in high-impact journals.

While education and social sciences remain dominant in publication volume, engineering research at UPI continues to expand. By implementing strategic initiatives, UPI can further establish itself as a leading institution in technological innovation and applied sciences.

3.4. Impact of engineering research on innovation and scientific output

Engineering research at UPI plays a pivotal role in driving scientific innovation and technological advancements. By contributing to both academic publications and real-world applications, engineering research significantly impacts scientific progress, industrial development, and educational advancements.

3.4.1. Engineering research and innovation

Engineering research at UPI has resulted in various technological innovations, patents, and applied research projects. Many engineering publications are not only theoretical but also contribute to practical solutions in industrial and educational

settings. The integration of engineering research with industry collaborations has led to product development, process improvements, and technological transfer to local and international partners. One of the key indicators of innovation within engineering research is the number of patents, prototypes, and applied research grants obtained by UPI researchers. However, despite the increasing volume of engineering publications, the translation of research into innovation remains a challenge, requiring stronger industry partnerships and commercialization strategies.

3.4.2. Scientific output and publication trends

The impact of engineering research is also reflected in the scientific output and annual publication trends. While UPI has made significant progress in increasing the number of engineering publications, fluctuations in research output highlight the need for sustained research efforts and funding support. Figure 6 presents the trend of engineering research publications from 2020 to 2025. As illustrated in Fig. 6, engineering research publications at UPI reached their peak in 2020 with 330 publications. However, a sharp decline followed in 2021, where the number of publications dropped significantly. The publication output remained relatively stable from 2021 to 2023, with minor fluctuations. In 2024, there was a notable increase to 236 publications, marking a resurgence in research productivity. However, as of early 2025, only 32 publications have been recorded, suggesting either a delay in indexing or a decline in research activity.

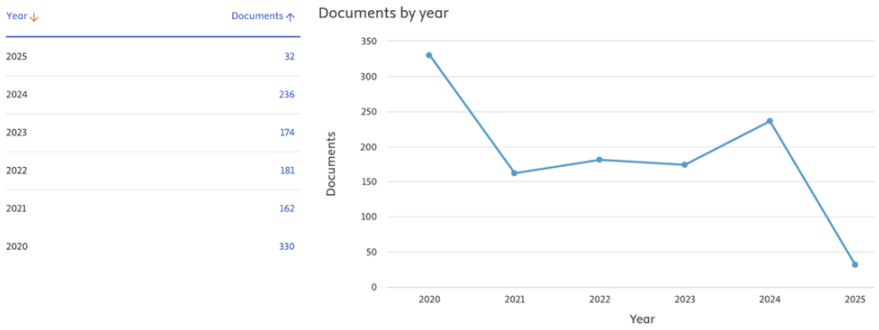


Fig. 6. Annual Trends in Engineering Research Publications at UPI (2020-2025). Data was sourced from Scopus and retrieved on 17 March 2025.

3.4.3. Engineering research and societal impact

Beyond academic publications, engineering research at UPI has had a tangible impact on community development, infrastructure projects, and technological education. Many engineering research initiatives contribute to renewable energy solutions, smart technology, and disaster mitigation strategies in Indonesia. To further enhance the impact of engineering research, UPI should:

(i) Encourage publications in high-impact engineering journals (Q1 & Q2) to improve citation metrics.
(ii) Strengthen research collaborations with global institutions to increase cross-institutional citations.
(iii) Promote interdisciplinary research integrating engineering with emerging fields such as artificial intelligence, environmental sustainability, and digital technologies.

(iv) Enhance funding opportunities to support cutting-edge engineering research.

By focusing on applied research and strengthening industry partnerships, UPI can further bridge the gap between academic research and societal needs, ensuring that engineering research contributes not only to scientific output but also to national innovation and economic growth.

3.5. Impact of engineering research on citation analysis and journal indexing status

The impact of engineering research at UPI extends beyond publication volume, as citation analysis and journal indexing status serve as key indicators of research influence and scholarly recognition. High-impact publications in indexed journals contribute to UPI's academic reputation, institutional ranking, and global research visibility [15].

3.5.1. Citation impact of engineering research

The impact of UPI's research can be seen through the number of citations received by published articles. Highly cited papers indicate the significance and influence of research outputs, as they are widely referenced by other scholars. Table 1 lists the most-cited research articles produced by UPI faculty members and students, with each article having received more than 100 citations based on Scopus data as of 17 March 2025. This table demonstrates UPI's scientific contributions, as these papers have been widely recognized and referenced by the global academic community.

Table 1. Highly Cited Articles (Cited More Than 100 Times) from UPI Faculty and Students. Data was retrieved from Scopus on 17 March 2025.

No.	Author	Title	Year	Journal	Cited	Ref.
1	Nandiyanto et al.	How to read and interpret FTIR spectroscope of organic material	2019	Indonesian Journal of Science and Technology	1581	[16]
2	Aziz et al.	Ammonia as effective hydrogen storage: A review on production, storage and utilization	2020	Energies	432	[17]
3	Rasmitadila et al.	The perceptions of primary school teachers of online learning during the covid-19 pandemic period: A case study in Indonesia	2020	Journal of Ethnic and Cultural Studies	424	[18]
4	Rajendran et al.	A critical review on various remediation approaches for heavy metal contaminants removal from contaminated soils	2022	Chemosphere	415	[19]
5	Chai et al.	Multifaceted roles of microalgae in the application of wastewater biotreatment: A review	2021	Environmental Pollution	310	[20]
6	Sorokowska et al.	Preferred Interpersonal Distances: A Global Comparison	2017	Journal of Cross-Cultural Psychology	296	[22]
7	Al Husaeni and Nandiyanto	Bibliometric Using Vosviewer with Publish or Perish (using Google Scholar data): From Step-by-step Processing for Users to the Practical Examples in the Analysis of Digital Learning Articles in Pre and Post Covid-19 Pandemic	2022	ASEAN Journal of Science and Engineering	265	[22]
8	Erdiwansyah et al.	An overview of Higher alcohol and biodiesel as alternative fuels in engines	2019	Energy Reports	193	[23]
9	Aubert et al.	Global Matrix 4.0 Physical Activity Report Card Grades for Children and Adolescents: Results and Analyses From 57 Countries	2022	Journal of Physical Activity and Health	188	[24]

No.	Author	Title	Year	Journal	Cited	Ref.
10	Hamidah et al.	A bibliometric analysis of COVID-19 research using vosviewer	2020	Indonesian Journal of Science and Technology	187	[25]
11	Dharmaraj et al.	Pyrolysis: An effective technique for degradation of COVID-19 medical wastes	2021	Chemosphere	179	[26]
12	Devadas et al.	Algae biopolymer towards sustainable circular economy	2021	Bioresource Technology	152	[27]
13	Fatimah et al.	How to Calculate Crystallite Size from X-Ray Diffraction (XRD) using Scherrer Method	2022	ASEAN Journal of Science and Engineering	148	[28]
14	Haristiani	Artificial Intelligence (AI) Chatbot as Language Learning Medium: An inquiry	2019	Journal of Physics: Conference Series	131	[29]
15	Nandiyanto et al.	Correlation between crystallite size and photocatalytic performance of micrometer-sized monoclinic WO3 particles	2020	Arabian Journal of Chemistry	131	[30]
16	Low et al.	Microalgae cultivation in palm oil mill effluent (Pome) treatment and biofuel production	2021	Sustainability (Switzerland)	127	[31]
17	Vashaei et al.	Structural variation of cubic and hexagonal Mg x Zn 1-xO layers grown on MgO(111)/c -sapphire	2005	Journal of Applied Physics	126	[32]
18	Chong et al.	Advances in production of bioplastics by microalgae using food waste hydrolysate and wastewater: A review	2021	Bioresource Technology	125	[33]
19	Hamidie et al.	Curcumin treatment enhances the effect of exercise on mitochondrial biogenesis in skeletal muscle by increasing cAMP levels	2015	Metabolism: Clinical and Experimental	123	[34]
20	Chai et al.	Microalgae and ammonia: A review on inter-relationship	2021	Fuel	120	[35]
21	Nandiyanto et al.	How bibliographic dataset portrays decreasing number of scientific publications from Indonesia	2020	Indonesian Journal of Science and Technology	117	[36]
22	Ragadhita and Nandiyanto	How to calculate adsorption isotherms of particles using two-parameter monolayer adsorption models and equations	2021	Indonesian Journal of Science and Technology	116	[37]
23	Song et al.	Effect of high-temperature thermal treatment on the structure and adsorption properties of reduced graphene oxide	2013	Carbon	115	[38]
24	Ogi et al.	Nanostructuring strategies in functional fine-particle synthesis towards resource and energy saving applications	2014	Advanced Powder Technology	115	[39]
25	Nandiyanto and Al Husaeni	A bibliometric analysis of materials research in Indonesian journal using VOSviewer	2021	Journal of Engineering Research (Kuwait)	109	[40]
26	Chia et al.	CO2 mitigation and phytoremediation of industrial flue gas and wastewater via microalgae-bacteria consortium: Possibilities and challenges	2021	Chemical Engineering Journal	104	[41]
27	Okely et al.	Global effect of COVID-19 pandemic on physical activity, sedentary behaviour and sleep among 3- to 5-year-old children: a longitudinal study of 14 countries	2021	BMC Public Health	103	[42]
28	Jupri and Drijvers	Student difficulties in mathematizing word problems in Algebra	2016	Eurasia Journal of Mathematics, Science and Technology Education	102	[43]

3.5.2. UPI's contribution to high-impact international journals

UPI continues to demonstrate its commitment to advancing scientific knowledge through the management of highly accredited international journals. Currently, three flagship journals managed by UPI have gained international recognition,

positioning the university among leading academic institutions. Based on data from Scimago Journal Rank (SJR) as of 17 March 2025, these journals include:

(i) Indonesian Journal of Science and Technology (IJOST; Q1)
(ii) ASEAN Journal of Science and Engineering (AJSE; Q2)
(iii) Indonesian Journal of Applied Linguistics (IJAL; Q2).

According to Scimago Journal Rank (SJR) (Fig. 7), IJOST has achieved a Q1 ranking with an SJR score of 0.9, making it one of the top-ranked scientific and technological journals in Indonesia. Meanwhile, AJSE has been classified as a Q2 journal with an SJR score of 0.579, reinforcing its status as a leading regional journal in science and engineering. Additionally, IJAL, despite not being included in Fig. 7, has long been internationally recognized and indexed in Scopus (SJR = 0.291), serving as an essential reference in the field of applied linguistics. The presence of these internationally indexed journals (see Fig. 7) underscores UPI's ability to compete not only nationally but also globally, contributing significantly to the global scientific community. These journals attract researchers from various countries, fostering international collaborations and enhancing UPI's academic visibility.

Beyond serving as academic publication platforms, UPI's internationally accredited journals support institutional performance indicators, including global university rankings, program accreditation, and the strengthening of research and innovation ecosystems [44, 45]. With these achievements, UPI reaffirms its position as one of the Indonesia's top academic institutions managing high-impact journals, making significant contributions to the advancement of science and technology at a global level. Moving forward, strengthening and maintaining these journals will remain a crucial part of UPI's strategy to enhance research quality and international publication standards.

	Title	Type	Publisher	↓ SJR	Total Docs. (2023)	Estimated APC (USD)	Estimated Value (USD)	
1	Narra J	journal		0.967 Q1	91	$3,309	$301,088	
2	Indonesian Journal of Science and Technology	journal	Universitas Pendidikan Indonesia	0.9 Q1	30	$3,183	$509,346	
3	Qudus International Journal of Islamic Studies	journal	STAIN Kudus	0.805 Q1	11	$2,855	$197,027	
4	Ahkam: Jurnal Ilmu Syariah	journal	Syarif Hidayatullah State Islamic University (UIN) Jakarta	0.68 Q1	23	$2,986	$128,406	
5	ASEAN Journal of Science and Engineering	journal	Universitas Pendidikan Indonesia	0.579 Q2	33	$3,010	$99,333	
6	Forest and Society	journal	Hasanuddin University	0.571 Q1	24	$2,918	$449,300	
7	Ijtihad: Jurnal Wacana Hukum Islam dan Kemanusiaan	journal	Faculty of Sharia State Islamic University of Salatiga	0.535 Q1	13	$2,967	$38,565	
8	Operations and Supply Chain Management	journal	Operations and Supply Chain Management Forum	0.518 Q2	42	$2,798	$517,682	

Fig. 7. Top 8 Ranked Journals in Scimago Journal Rank (SJR) in Indonesia. Data was retrieved from ScimagoJR on 17 March 2025.

3.5.3. Most cited articles in UPI's flagship journals

UPI-managed journals have gained international recognition, with many of their published articles receiving high citation counts, proving their significant

contributions to scientific advancements. The high citation rates indicate that these articles are not only utilized by internal academic circles but also serve as key references for researchers worldwide.

To provide a more detailed perspective, Tables 2 and 3 present the top 10 most-cited articles from IJOST and AJSE, respectively. These tables highlight UPI's role in shaping global academic discussions and reinforcing its reputation as a key player in international research contributions. These tables confirm that UPI's journals have become an integral part of the global academic conversation, reinforcing the university's reputation as a leading institution in research and scientific contributions.

Table 2. Top 10 Most Cited Articles in IJOST.
Data was retrieved from Scopus on 17 March 2025.

No.	Authors	Title	Year	Cited	Ref.
1	Nandiyanto et al.	How bibliographic dataset portrays decreasing number of scientific publications from Indonesia	2020	118	[44]
2	Nandiyanto et al.	How to read and interpret FTIR spectroscope of organic material	2019	1583	[45]
3	Hamidah et al.	A bibliometric analysis of COVID-19 research using vosviewer	2020	187	[46]
4	Setiyo et al.	The concise latest report on the advantages and disadvantages of pure biodiesel (B100) on engine performance: literature review and bibliometric analysis	2021	122	[47]
5	Ragadhita and Nandiyanto	How to calculate adsorption isotherms of particles using two-parameter monolayer adsorption models and equations	2021	116	[37]
6	Soegoto et al.	A Bibliometric Analysis of Management Bioenergy Research Using Vosviewer Application	2022	108	[48]
7	Nandiyanto et al.	Interpretation of Fourier Transform Infrared Spectra (FTIR): A Practical Approach in the Polymer/Plastic Thermal Decomposition	2023	98	[49]
8	Novie et al.	Review: Agricultural wastes as a source of silica material	2016	91	[50]
9	Mulyanti et al.	Distance learning in vocational high schools during the covid-19 pandemic in West Java province, Indonesia	2020	90	[51]
10	Ana	Trends in expert system development: A practicum content analysis in vocational education for over grow pandemic learning problems	2020	84	[52]

Table 3. Top 10 Most Cited Articles in AJSE.
Data was retrieved from Scopus on 17 March 2025.

No.	Author	Title	Year	Cited	Ref.
1	Al Husaeni and Nandiyanto	Bibliometric Using Vosviewer with Publish or Perish (using Google Scholar data): From Step-by-step Processing for Users to the Practical Examples in the Analysis of Digital Learning Articles in Pre and Post Covid-19 Pandemic	2022	265	[53]
2	Fatimah et al.	How to Calculate Crystallite Size from X-Ray Diffraction (XRD) using Scherrer Method	2022	150	[54]
3	Shidiq	A Bibliometric Analysis of Nano Metal-Organic Frameworks Synthesis Research in Medical Science Using VOSviewer	2023	67	[55]
4	Al Husaeni et al.	How Technology Can Change Educational Research? Definition, Factors for Improving Quality of Education and Computational Bibliometric Analysis	2024	38	[56]
5	Ramadhan et al.	Dental Suction Aerosol: Bibliometric Analysis	2022	36	[57]

No.	Author	Title	Year	Cited	Ref.
6	Nandiyanto et al.	Research Trends from The Scopus Database Using Keyword Water Hyacinth and Ecosystem: A Bibliometric Literature Review	2024	29	[58]
7	Sukamto and Rahmat	Evaluation of FTIR, Macro and Micronutrients of Compost from Black Soldier Fly Residual: in Context of Its Use as Fertilizer	2023	26	[59]
8	Asif et al.	Pollutant Emissions from Brick Kilns and Their Effects on Climate Change and Agriculture	2021	24	[60]
9	Sheng et al.	Assessment and Optimization of Coagulation Process in Water Treatment Plant: A Review	2023	23	[61]
10	Rochman et al.	How Bibliometric Analysis Using VOSviewer Based on Artificial Intelligence Data (using ResearchRabbit Data): Explore Research Trends in Hydrology Content	2024	22	[62]

3.6. Contributions of UPI's engineering researchers to the world's top 2% scientists

UPI continues to demonstrate its commitment to advancing research quality and international scientific publications. As one of the Indonesia's leading public universities, UPI consistently strives to enhance the academic capacity and research capabilities of its faculty members to produce high-impact research.

One of the key indicators of this achievement is the inclusion of UPI's researchers in the World's Top 2% Scientists, a prestigious global ranking compiled by Stanford University in collaboration with Elsevier. This ranking recognizes the most influential scientists worldwide, based on bibliometric indicators such as citation count, h-index, and co-authorship-adjusted impact. According to the 2025 edition of the World's Top 2% Scientists ranking, five UPI faculty members were included in the global list of top scientists. This marks the highest achievement for UPI since 2020. From 2020 to 2023, UPI consistently had one scientist listed, namely Prof. Dr. Eng. Asep Bayu Dani Nandiyanto, who was recognized in the list each year. A significant increase occurred in 2024, with the inclusion of four additional UPI researchers, bringing the total to five scientists in the 2025 edition.

Table 4 provides a detailed list of UPI faculty members included in the World's Top 2% Scientists 2025, along with their national and global rankings.

Table 4. UPI Scientists in the World's Top 2% Scientists List (2025 Edition).

No.	Name	Major	Indonesia Ranking	Global Ranking
1	Asep Bayu Dani Nandiyanto	Chemical Engineering	1	11.291
2	Nor Azwadi Che Sidik	Mechanical Engineering	13	40.235
3	Heli Siti Halimatul Munawaroh	Chemistry	83	183.927
4	Dwi Fitria Al Husaeni	Information Technology Education	96	191.276
5	Risti Ragadhita	Chemical Engineering	100	196.048

Based on the national ranking of the number of Top 2% of Scientists per institution in 2024, UPI ranked 8th in Indonesia, with a total of five scientists listed in the World's Top 2% of Scientists. This achievement places UPI alongside major Indonesian universities, such as Universitas Gadjah Mada, Universitas Diponegoro, and Universitas Padjadjaran, as shown in Fig. 8.

This accomplishment represents a significant milestone in UPI's pursuit of global research excellence. The increased number of UPI researchers included in the World's Top 2% Scientists list reflects the university's continuous efforts to strengthen research capacity, fostering international collaboration, and enhance scientific publication quality. As a higher education institution focused on scientific advancement, UPI aims to position itself as a globally competitive research university. Moving forward, UPI is committed to:

(i) Increasing the quantity and quality of international scientific publications.
(ii) Expanding global research collaborations with leading universities and research institutions.
(iii) Developing an academic ecosystem that fosters research-driven innovation.
(iv) Enhancing faculty and researcher capabilities in strategic research fields.

UPI's recognition in the World's Top 2% Scientists list is a testament to its ongoing efforts in advancing research and innovation. This achievement serves as an inspiration and motivation for the entire UPI academic community to continue contributing to scientific knowledge and technological advancements. Furthermore, it reinforces UPI's role in national and international scientific development, establishing the university as a key player in global academic and research networks.

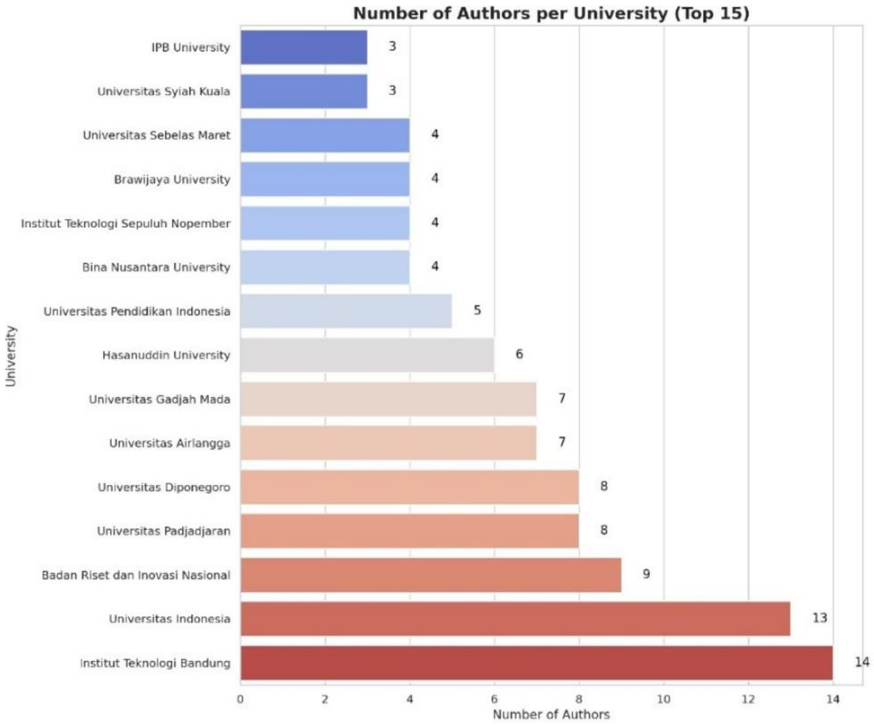


Fig. 8. UPI's Position in the national research landscape.

4. Conclusions

UPI has demonstrated remarkable progress in engineering research, innovation, and international scientific contributions over the past five years. The university's

commitment to enhancing research quality, expanding global collaborations, and increasing publication output has positioned it as one of the Indonesia's leading institutions in engineering and technology research. This study analysed the trends, impacts, and challenges in UPI's engineering research, revealing key achievements and areas for improvement. Several important conclusions can be drawn from this analysis:

(i) Growth in Engineering Publications and International Collaboration
- UPI has significantly increased its engineering publication output, with a growing share of papers indexed in Scopus and Web of Science (WoS).
- The university has strengthened its global research partnerships, collaborating with institutions from Malaysia, Japan, Australia, China, and the UK.
- The presence of UPI-managed journals in Scimago Journal Rank (SJR), such as the Indonesian Journal of Science and Technology (Q1) and ASEAN Journal of Science and Engineering (Q2), highlights the university's active role in academic publishing.

(ii) Impact of Engineering Research on Scientific Contributions
- Several highly cited articles produced by UPI researchers have gained global recognition, contributing to advancements in materials science, renewable energy, digital technologies, and engineering education.
- The inclusion of five UPI faculty members in the World's Top 2% Scientists list underscores the university's rising impact on global research rankings.
- Citation analysis confirms that engineering research from UPI is making substantial contributions to knowledge dissemination and technological advancements.

UPI's achievements in engineering research, citation impact, and international recognition reflect its dedication to scientific excellence and innovation. However, addressing the existing challenges and implementing strategic initiatives will be essential for UPI to sustain its research momentum and become a globally competitive research university.

Moving forward, UPI's research agenda should align with global engineering trends, emerging technologies, and industrial needs to ensure continued relevance and impact. By strengthening its research ecosystem, expanding international networks, and promoting innovation-driven research, UPI will further solidify its position as a leading centre for engineering research and scientific excellence in Indonesia and beyond.

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