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Helwan University international research contribution in pure and applied sciences: analysis of the trend journals in Scopus 1976-2023

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Abstract

The study aimed to analyze the scientific journals that have published the largest share of the scientific output of Helwan University faculty members in the fields of pure and applied sciences indexed in the Scopus database during the period (1976–2023). This was achieved by identifying the journals that accommodated the largest volume of this output, the number of papers published in each journal, and their disciplinary affiliations, thereby highlighting the international publishing trends of the university in these fields.

The study also analyzed the bibliometric indicators of the journals under investigation, particularly CiteScore, SJR, and SNIP, with the aim of measuring their scientific impact, identifying the visibility and influence of the research published therein, and evaluating the quality of the scientific publishing channels utilized by Helwan University faculty members at the international level.

The findings revealed that the Egyptian Journal of Chemistry ranked first among the journals publishing Helwan University's scientific output, with 174 published papers, followed by the Journal of High Energy Physics with 135 papers and SAE Technical Papers with 129 papers. The analysis of bibliometric indicators (CiteScore, SJR, and SNIP) further showed that several journals repeatedly appeared among the top-ranked journals across more than one indicator, including Alexandria Engineering Journal, IEEE Access, and Scientific Reports, reflecting their strong scientific impact and prominent presence across different research impact assessment metrics.

In light of these findings, the study recommends encouraging faculty members to publish in high-impact international journals indexed in the Scopus database and providing the necessary financial support to promote further research in the fields of pure and applied sciences. The study also recommends training faculty members in the effective use of the Scopus database and enhancing their understanding of bibliometric indicators, thereby contributing to improving the quality of international scientific publishing and enhancing the university's research ranking.

Research scope and methodology

The study focuses on the international scientific production of Helwan University faculty members. The methodology employs a bibliometric approach combined with descriptive and analytical tools to measure both the quantity and the qualitative impact of research.

Scope of analysis

- Timeframe: 1976 to 2023.
- Database: Scopus.
- Subjects: Pure and Applied Sciences, categorized into five main disciplines and 20 sub-specialties.
- Population: 22,454 research papers, with a significant concentration (92.7%) originating from scientific faculties compared to theoretical faculties (7.3%).

Subject distribution of scientific production

Main Discipline	Percentage of Total	Sub-specialties
Engineering Sciences	38.2%	Engineering, Materials Science, Energy, Chemical Engineering
Basic Sciences	36.7%	Physics/Astronomy, Chemistry, Biochemistry/Genetics, Mathematics, Environmental Science, Earth Sciences, Immunology
Medical Sciences	13.2%	Medicine, Pharmacology/Toxicology, Neuroscience, Nursing, Veterinary, Health Professions, Dentistry
Computer Science & AI	8.9%	Computer Science, Information Systems, IT
Agricultural & Biological Sciences	3.0%	General Agricultural/Biological research

Analysis of leading publication channels

The research identifies the journals that most frequently host Helwan University's scientific output. The analysis reveals that the university relies on a mix of local-international hybrids and high-prestige global journals.

Top journals by publication volume (overall)

1. Egyptian Journal of Chemistry: 174 studies (Ranked 1st).
2. Journal of High Energy Physics: 135 studies (Ranked 2nd).
3. SAE Technical Papers: 129 studies (Ranked 3rd).

Subject-specific leading journals

The following table highlights the top three journals for each major discipline based on the number of documents (N) and their impact percentiles (P).

Discipline	Leading Journals	Documents (N)
Engineering	<i>Egyptian Journal of Chemistry, SAE Technical Papers, IEEE Access</i>	174, 129, 97
Basic Sciences	<i>Egyptian Journal of Chemistry, Journal of High Energy Physics, SAE Technical Papers</i>	174, 135, 129
Medical Sciences	<i>Molecules, European Journal of Medicinal Chemistry, Bioorganic Chemistry</i>	62, 32, 30
Computer Science	<i>IEEE Access, Sustainability Switzerland, Int. Journal of Adv. Computer Science</i>	97, 61, 60
Agricultural	<i>Saudi Journal of Biological Sciences, Natural Product Research</i>	29, 28

Evaluation of scientific impact

The study utilizes three primary bibliometric indicators to assess the quality and "prestige" of the publication channels used by Helwan University faculty.

Bibliometric indicator definitions

- CiteScore: Measures the average citations received per document over a four-year window.
- SJR (SCImago Journal Rank): Measures the scientific prestige of a journal by weighting citations based on the importance of the citing source (similar to Google's PageRank).
- SNIP (Source Normalized Impact per Paper): Corrects for differences in citation practices between scientific fields, allowing for a fair comparison across disciplines.

Highest impact journals by metric

Metric	Leading Journal	Score
CiteScore	<i>Journal of High Energy Physics</i>	10.3
	<i>Alexandria Engineering Journal</i>	9.1
	<i>IEEE Access</i>	9.0
SJR	<i>Scientific Reports</i>	0.973
	<i>Alexandria Engineering Journal</i>	0.933
	<i>IEEE Access</i>	0.926
SNIP	<i>Alexandria Engineering Journal</i>	2.006
	<i>IEEE Access</i>	1.422
	<i>Scientific Reports</i>	1.312

Key findings and observations

1. Volume vs. Quality dynamics

The journal with the highest volume of publications (*Egyptian Journal of Chemistry*) possesses a relatively lower impact factor (CiteScore 1.9) compared to journals with fewer Helwan-authored papers. For instance, the *Journal of High Energy Physics* hosts 135 studies but carries a CiteScore of 10.3. This suggests that while volume is high in certain channels, the university's "prestige" is heavily supported by a smaller number of high-impact publications.

2. Strategic advantages of specific channels

- **Egyptian Journal of Chemistry:** Its dominance is attributed to its local roots (issued by the Egyptian Chemical Society), which facilitates easier communication and faster publication cycles for Egyptian researchers.
- **SAE Technical Papers:** Distinguished by its focus on the automotive, aerospace, and commercial vehicle sectors, providing high-quality peer review by industry experts.
- **Open Access Influence:** Journals like *IEEE Access* and *Scientific Reports* show high presence in impact rankings, likely due to their open-access nature which increases the visibility and citation potential of the research.

3. Faculty concentration

Research activity is intensely concentrated in the Scientific Faculties, primarily those located at the main Helwan Campus and the engineering-focused satellite campuses in Helwan and Mataria.

Conclusions and recommendations

The data indicates that Helwan University has established a robust international presence in Scopus, particularly in Engineering and Basic Sciences. To further enhance the university's global ranking and research reputation, the study offers several strategic recommendations:

- **Elevate Publication Standards:** Encourage faculty to shift their focus toward high-impact journals (high CiteScore/SJR) rather than prioritizing publication volume in lower-impact outlets.
- **Financial and Institutional Support:** Provide adequate funding for research in pure and applied sciences to ensure the quality and modernity of the output.
- **Bibliometric Training:** Conduct training for researchers on how to use Scopus effectively and how to select publication channels based on bibliometric indicators (CiteScore, SJR, SNIP).
- **Incentivize High-Impact Publishing:** Implement institutional rewards or recognition for researchers who publish in top-tier global journals, which directly improves the university's "h-index" and international classification.
- **Develop Regional Metrics:** The study suggests the creation of an "Arabic Index" to better measure and categorize research published in the Arabic language, ensuring its impact on the global scientific community is recognized.