

The Contribution of Ancient Egyptian Civilization to Science and Technology

DOI:10.21608/ERURJ.2025.463010

On the occasion of the Grand Egyptian Museum's opening in Cairo, the world is reminded that the civilization of the Nile was not only about pharaohs and pyramids but also about innovation, science, and enduring creativity. Ancient Egypt's brilliance shines through its advances in mathematics, engineering, medicine, and astronomy, which laid the foundations for many aspects of modern life.

The Egyptians mastered practical mathematics early on. The Rhind Papyrus shows their use of doubling and halving to perform multiplication, a method centuries ahead of its time. They also invented papyrus and ink, enabling trade, medicine, and architecture record-keeping. Writing transformed their society into one that could plan, manage, and preserve knowledge across generations.

Behind Egypt's monuments stood a deep understanding of mechanics and organization. Builders used ramps, levers, and geometry to move massive stones precisely. They also engineered canals, dikes, and the shaduf to harness the Nile's floods, turning the land into one of the world's earliest examples of sustainable agriculture.

Egyptian priests observed the stars to predict the Nile's flood and created one of the first solar calendars: twelve months of thirty days plus five festival days. Using instruments like the merkhet and water clocks, they measured time and oriented temples to the heavens, blending science with spirituality.

Ancient physicians treated wounds with honey and herbs and used bronze instruments for surgery. Their work in glass, metals, and cosmetics revealed early chemical knowledge. Mummification itself showed a remarkable grasp of anatomy and preservation.

The Grand Egyptian Museum is more than a collection of artefacts; it is a living tribute to human curiosity and invention. The Egyptians' achievements remind us that progress begins with

observation and persistence. Their harmony with nature and search for understanding still offer lessons for modern innovation and sustainability.

The ERURJ July 2025 issue included nineteen articles related to the United Nations Sustainable Development Goals. In this regard, the review by the research article by El-Husseiny et al [1] focused on the gut microbiota, which plays a vital role in regulating the gut-brain axis, influencing neurological health and the progression of neurodegenerative disorders such as Alzheimer's and Parkinson's diseases. Understanding this interaction helps develop new therapeutic approaches targeting the microbiome to manage or prevent such diseases. This topic aligned with SDG 3 (Good Health and Well-Being), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 4 (Quality Education) through advancing medical research and health awareness. Also, the review by Kamal and Hagag [2] addressed how personalized medicine revolutionizes clinical pharmacy by customizing drug therapy based on genetic and molecular profiles, ensuring safer and more effective treatments. Through pharmacogenomics, clinicians can predict drug responses and tailor regimens to individual needs, supported by AI and molecular tools that advance precision healthcare. This approach directly supported SDG 3 (Good Health and Well-Being), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 4 (Quality Education) by promoting innovative, data-driven, and ethically guided medical practices that enhance patient care and professional development. Similarly, the review by Helmy et al [3] revealed how cystic fibrosis patients often face life-threatening infections from *Pseudomonas aeruginosa* and the *Burkholderia cepacia* complex, both exhibiting strong antimicrobial resistance and complicating treatment outcomes. Accurately identifying these pathogens is critical, as their susceptibility patterns differ and misdiagnosis can hinder effective therapy. This issue is aligned with SDG 3 (Good Health and Well-Being) through advancing infection control, SDG 9 (Industry, Innovation, and Infrastructure) via promoting research in antimicrobial innovation, and SDG 4 (Quality Education) by emphasizing clinical awareness and diagnostic accuracy. The review by Naimy et al [4] discussed how nanotechnology is transforming the treatment of hepatic diseases by enabling precise drug delivery, early diagnosis, and reduced side effects compared to traditional therapies. Through innovations in nanomedicine, liver conditions such as fibrosis, infections, and cancer can be managed more effectively using targeted nano-therapies and advanced imaging techniques. This aligned with SDG 3 (Good Health and Well-Being) by improving healthcare outcomes, SDG 9 (Industry, Innovation, and Infrastructure) by fostering medical innovation, and

SDG 17 (Partnerships for the Goals) through promoting global collaboration in biomedical research. Furthermore, the review by El-Abassy and Ibrahim [5] covered the precise analytical methods for safinamide, a recently approved drug for Parkinson's disease, to ensure its quality and safety in pharmaceutical and biological samples. Current research reviews various spectroscopic, electrochemical, and chromatographic techniques used for its determination, emphasizing eco-friendly extraction and improved accuracy. This aligned with SDG 3 (Good Health and Well-Being) by enhancing therapeutic monitoring, SDG 9 (Industry, Innovation, and Infrastructure) through advancing analytical innovation, and SDG 12 (Responsible Consumption and Production) by promoting sustainable laboratory practices.

The research article by Sweilam et al [6] studied the caffeine content of two Turkish coffee brands sold in Saudi Arabia using UV-Visible spectrophotometry, examining other bioactive compounds like catechins and tannins. Findings highlight differences in caffeine concentration due to factors such as bean type and roasting process, supporting consumer awareness and regulatory transparency. The work contributed to SDG 3 (Good Health and Well-Being) by promoting informed consumption, SDG 12 (Responsible Consumption and Production) through labeling and safety compliance, and SDG 9 (Industry, Innovation, and Infrastructure) by applying analytical innovations in food quality assessment. In addition, the mini review by Abd Elhafeez et al [7] unraveled *Terminalia muelleri Benth*, a native Australian tree with diverse phytochemicals with antioxidant, antimicrobial, anti-inflammatory, and hepatoprotective properties supporting its traditional medicinal uses. Scientific validation of these bioactive compounds could enable new plant-based therapeutic developments and bridge indigenous knowledge with modern pharmacology. This aligned with SDG 3 (Good Health and Well-Being) by promoting natural medicine research, SDG 15 (Life on Land) through conserving biodiversity, and SDG 9 (Industry, Innovation, and Infrastructure) by fostering innovation in pharmaceutical science.

The short communication by Tarek [8] detailed the successful root canal treatment of a mandibular first molar with an additional third root, *radix entomolaris*, followed over 12 months. Recognizing such anatomical variations is vital for accurate diagnosis and effective endodontic management to ensure long-term treatment success. The study supports SDG 3 (Good Health and Well-Being) by improving dental care outcomes, SDG 4 (Quality Education) through advancing clinical

knowledge in dental anatomy, and SDG 9 (Industry, Innovation, and Infrastructure) by encouraging precision techniques in modern endodontics. Moreover, the research article by Metwaly et al [9] compared polyethylene fiber-reinforced and standard bulk-fill resin composites in restoring endodontically treated molars over two years, finding both techniques to perform effectively with no significant differences. The results suggested that bulk-fill composites are a reliable restorative option for teeth with moderate structural loss. This research supported SDG 3 (Good Health and Well-Being) by enhancing oral health outcomes, SDG 9 (Industry, Innovation, and Infrastructure) through advancing dental materials technology, and SDG 4 (Quality Education) by contributing to evidence-based clinical practice. The research article by Mofreh et al [10] applied deep learning models such as DenseNet121 and ResNet50 to detect diabetic retinopathy from retinal images, achieving high accuracy and reliability in early diagnosis. The results demonstrated the potential of AI-assisted screening to prevent vision loss and enhance healthcare efficiency. This aligned with SDG 3 (Good Health and Well-Being) through improved disease detection, SDG 9 (Industry, Innovation, and Infrastructure) via AI innovation in healthcare, and SDG 4 (Quality Education) by advancing medical AI research and training. In addition, the research article by Fouad et al [11] analyzed the global impact of COVID-19 on awareness and healthcare capacity, revealing disparities in pandemic responses across continents through statistical dashboards. It emphasized how infrastructure, demographics, and preparedness shaped outcomes, highlighting successes like Nigeria's response and challenges in the UK, Russia, and India. The research aligned with SDG 3 (Good Health and Well-Being) by strengthening pandemic resilience, SDG 9 (Industry, Innovation, and Infrastructure) through data-driven healthcare systems, and SDG 17 (Partnerships for the Goals) by promoting global collaboration in health crisis management.

The review by Ellakwa et al [12] highlighted recent innovations in glass-ceramic production methods, such as heat treatment, sol-gel, and recycling techniques, enhancing performance across industries from medicine to electronics and construction. Emphasizing sustainability and efficiency, the study underscores the environmental and industrial potential of glass-ceramics. It aligned with SDG 9 (Industry, Innovation, and Infrastructure) through material innovation, SDG 12 (Responsible Consumption and Production) by encouraging recycling and waste reduction, and SDG 13 (Climate Action) through promoting energy-efficient manufacturing. The research article by Ibrahim et al [13] explored how civil engineering is evolving toward

sustainability by adopting green building materials such as self-healing concrete and bio-cement. Applying the Life Cycle Assessment demonstrated how these innovations lower carbon emissions, improve waste management, and extend the building's lifespan. The study supports SDG 9 (Industry, Innovation, and Infrastructure), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Action) by promoting eco-friendly construction practices and sustainable urban development. Furthermore, the research article by Charawi et al [14] explored how sustainable urban rehabilitation preserved cultural heritage while meeting modern urban needs through strategic planning and stakeholder collaboration. It highlighted the importance of balancing environmental, social, and economic dimensions to maintain cultural identity and urban vitality. The research aligned with SDG 11 (Sustainable Cities and Communities), SDG 8 (Decent Work and Economic Growth), and SDG 17 (Partnerships for the Goals) by promoting inclusive, sustainable, and culturally resilient urban development.

The research article by Kamal [15] explored the growing role of AI-powered virtual social media influencers in brand advertising, comparing their effectiveness with human influencers in shaping consumer engagement. It highlighted how virtual influencers offer brands greater control, adaptability, and risk reduction in digital campaigns. The research aligned with SDG 9 (Industry, Innovation, and Infrastructure) by advancing digital innovation, SDG 8 (Decent Work and Economic Growth) through evolving marketing industries, and SDG 12 (Responsible Consumption and Production) by promoting ethical and sustainable advertising practices.

The study by Yussuf and Ezzat [16] examined how AI-powered tools like Coohom transform interior design by improving visualization, accuracy, and workflow efficiency compared to traditional methods. Findings show that AI enhances creativity, reduces design time, and improves user experience in real-world projects. The research supported SDG 9 (Industry, Innovation, and Infrastructure) through technological innovation, SDG 11 (Sustainable Cities and Communities) by promoting efficient design practices, and SDG 4 (Quality Education) by fostering digital skills in creative industries. The research article by Mussa and Ashour [17] examined how influencer marketing shapes consumer behavior in Egypt's food industry, revealing a strong correlation between influencer endorsements and purchasing decisions. Findings suggest that food brands should adopt influencer strategies to build stronger consumer trust and engagement. The research supported SDG 8 (Decent Work and Economic Growth) through

marketing innovation, SDG 9 (Industry, Innovation, and Infrastructure) by advancing digital business models, and SDG 12 (Responsible Consumption and Production) by promoting informed consumer choices.

The research article by Ibrahim [18] investigated how structural contradiction in contemporary art influences the aesthetics of bas-relief sculpture by blending opposing materials, forms, and ideas. It revealed how such contrasts challenge traditional artistic harmony and provoke more profound reflection on perception and meaning. The research aligned with SDG 4 (Quality Education) by enriching cultural and artistic understanding, SDG 11 (Sustainable Cities and Communities) through promoting cultural heritage and creative expression, and SDG 9 (Industry, Innovation, and Infrastructure) by encouraging innovation in artistic practices. Furthermore, the article by Abdelmeguid [19] explored how generative artificial intelligence enables artists to merge geometric relationships with organic formations, creating innovative digital media artworks that balance visual and intellectual expression. It demonstrated how AI tools like Adobe Firefly support creativity while respecting intellectual property. The research aligned with SDG 9 (Industry, Innovation, and Infrastructure) by advancing digital art technologies, SDG 4 (Quality Education) through fostering creative and technological literacy, and SDG 16 (Peace, Justice, and Strong Institutions) by emphasizing ethical use of AI and copyright protection.

The diversity of these publications is evident in the coverage of nine out of the seventeen Sustainable Development Goals (SDGs) within the papers presented in this issue (Figure 1). These studies encompass various fields, including health, innovation, education, sustainability, and economic growth, highlighting the journal's dedication to supporting multiple dimensions of the 2030 Sustainable Development Agenda.

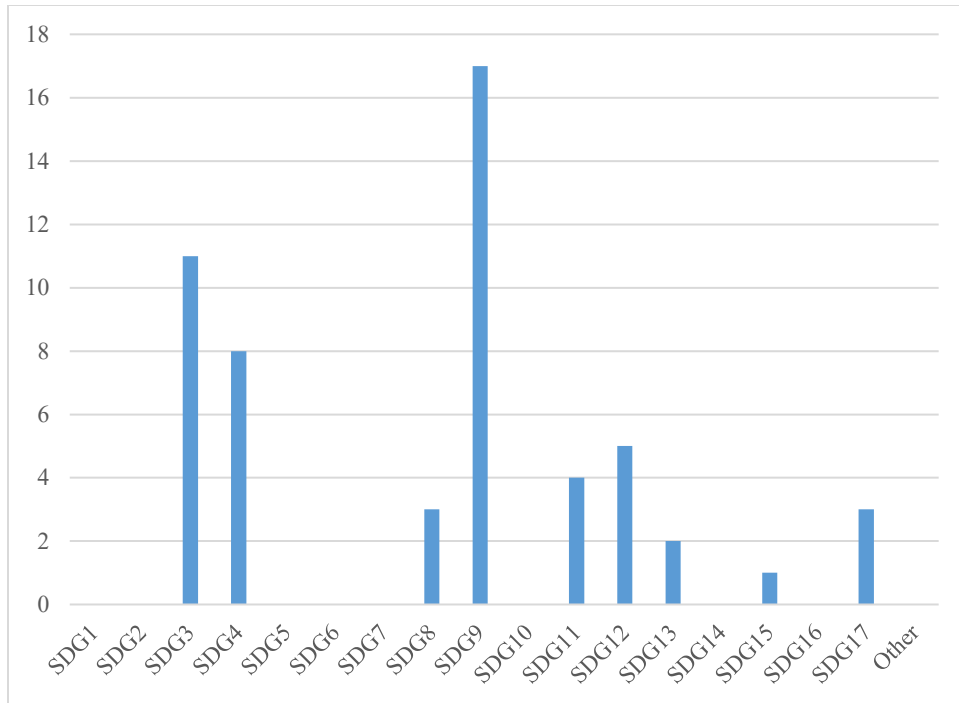


Figure 1: Articles Published in ERURJ July 2025 issue and their relation to SDGs

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