

Introduction to Special Issue on Science Technology Innovation and Development in Africa

Swapan Kumar Patra^{1,2,*}, Mammo Muchie³, Anup Kumar Das⁴

¹South African Research Chair Initiative (SARChI) Innovation Studies, Tshwane University of Technology, Pretoria, SOUTH AFRICA.

²Sidho-Kanho-Birsha University, Purulia, West Bengal, INDIA.

³Tshwane University of Technology, Pretoria, SOUTH AFRICA.

⁴Centre for Studies in Science Policy, School of Social Sciences, Jawaharlal Nehru University, New Delhi, INDIA.

ABSTRACT

Africa is the second largest continent on Earth after Asia. It has enormous diversity in terms of socio-economic and demographic conditions. Although Africa is rich in mineral and natural resources, overall, the continent is considered less developed because many of the least developed countries (in terms of GDP) are from Africa. As Science, Technology, Innovation and Development are perhaps one of the means for the continent's overall development; various African governments aspire to move their populations from poverty by adopting various Science Technology & Innovation policies. This special issue of the *Journal of Scientometric Research* is devoted to the various issues of Africa's Science Technology Innovation and Development. A call for papers was announced in the year 2020. Several papers were received with the call for papers, and finally, ten papers were selected after a double-blind peer-reviewed process. This editorial paper is a brief introduction to all the papers received.

Keywords: Special Issue, Science Technology Innovation and Development, Africa, Bibliometrics, Scientometrics, Policy Studies.

Correspondence

Swapan Kumar Patra

¹Career Advancement Research Fellow, South African Research Chair Initiative (SARChI) Innovation Studies, Tshwane University of Technology, Pretoria, SOUTH AFRICA.

²Department of Library and Information Science, Sidho-Kanho-Birsha University, Purulia, West Bengal, INDIA.

Email id: skpatra@gmail.com

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INTRODUCTION

The African Union (previously Organisation of African Unity) has developed Science, Technology, and Innovation (STI) strategy for African sustainable development. The Organisation of African Unity (OAU) adopted various STI strategies from time to time. For example, in 1979, Africa adopted the Monrovia Strategy; in 1980 adopted the Lagos Plan of Action. In 2013, the African Union (AU) had produced "Agenda 2063"^[1] to realize fully African unity by integrating the economy with science, technology, and innovation. The Africa Union has NEPAD, Peer Review Mechanism, Peace and Security, the African Parliament, STISA 2024, and Agenda 2063. The AU is good at producing protocols to generate the "Africa We Want" to transform Africa "into the global powerhouse of the future". This agenda 2063 has included science, technology, and innovation (STI) for Africa's overall integrated and sustainable development by aligning with the STISA 2024 that has been declared a year after agenda 2063. In 2014, the AU created a specific sectoral strategy on science, technology, and innovation by

adopting a 10-year Science, Technology, and Innovation Strategy for Africa (STISA-2024).^[2] The strategy addresses the pressing challenges through skills development, capacity building, entrepreneurship development, intellectual property generation, and protection.

All the strategies are well articulated, but the implementation is challenging. A few countries like South Africa, Rwanda, Kenya, and many Northern African countries are comparatively quite well-performing. However, empirical evidences show that some other countries in the continent are lagging behind.^[3] Output indicators (patent and publication counts) show that there is a significant increase in the number of scientific publications and patents from Africa. However, the publications and patents from Africa are attributed to only a few countries, for example, South Africa from the South, Nigeria from the West, and Egypt from the North. Hence, there is a need to cover as many parts of Africa as possible to discover the research publications and patents generated in all parts of Africa. Moreover, there is also a need for policy study to see the policy implication in the scientific output from the continent.

Initiating A Call for Papers

The *Journal of Scientometric Research* (JSciRes) announced a special issue on various Science and Technology issues of the African continent, and released a call for papers in February

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2020. The aim of this call was to comprehend the breadth and depth of African Science. The special issue called for research articles on various issues related to Science, Technology, and Innovation in the African continent. The special issue considered topics related to STI indicators, country-specific case studies from the STI policy perspectives, etc in African context. In response to the call for papers, the journal received a number of submissions in various thematic areas. After many rounds of the double-blind peer review process, the following ten papers are selected. The papers are categorised into two broad themes. In the first theme, the papers used various quantitative indicators for mapping science in Africa, and in the second category, the papers mainly discuss various thematic issues related to STI in Africa.

Organization of articles in this Special Issue

The first article in the issue is written by Swapan Kumar Patra and Mammo Muchie titled “Scientific and Technical Productivity of African countries: What Scopus and WIPO Patentscope data tell us?”. The article has taken the Scopus data to map the scientific outputs in terms of publication activities and WIPO patent data for patenting activity of the member countries of the African Union (AU). The article has used various well-established scientometrics indicators. The study observed a visible growth in publications from Africa in multiple disciplines. Moreover, African publications are well-cited globally. It means that African research is relevant in the global science and technology landscape.

The second article by Radhamany Sooryamoorthy titled “Science in Africa: Contemporary Trends in Research” is also a scientometrics study on overall science in Africa based on Web of Science (WoS) data. The study examined the strengths of African science and the individual contribution of African countries to the world. The article observed that there are disparities in science among countries of the African continent.

These papers have used two major global indexing and abstracting databases, i.e., Scopus and Web of Science respectively to map the science in Africa. It is generally a well-established fact that the coverage of African science in the global citation database is limited; however, the empirical evidences from both these major databases will give a holistic picture of African science.

The third article by Eustache Mègnigbêto titled “Science in West Africa after the first regional STI policy: a global view (2011–2020)” is the scientometrics study based on Web of Science data. The study has observed that over the decade 2011–2020, the West Africa region’s scientific production is growing more rapidly. However, the scientific productivity of the countries varies. Nigeria is the largest producer of scientific publications in the region; however, Ghana is the one

that imparts production speed to the region. Moreover, West African countries are looking at their research infrastructure to improve further in scientific production.

The fourth article by Oluseye Jegede titled “Knowledge Literacy on Fourth Industrial Revolution: a scientometric analysis of Research Outputs from the ECOWAS region in Africa” has measured the trends of research output from the West African countries (ECOWAS region) using Scopus data on the fourth industrial revolution (4IR). The study has observed that the knowledge production culled from the broad field of specialization in computer science research in all ECOWAS states. Moreover, the study also provided information on the breadth of collaboration by ECOWAS member states on 4IR and the overall impact of the collaboration of research productivity in the region.

The fifth article is written by Abdelkader Djeflat titled “Science, Technology and Innovation measurements in the Maghreb Union (AMU) and the impact of indicators: the institutional dimension”. The study has observed that five Maghreb countries (Algeria, Libya, Tunisia, Morocco, and Mauritania) had made significant efforts to increase scientific productivity (both publications and patents) in recent years. The author anticipated that the increase in scientific output is due to the various policies adopted by the respective governments. However, institutional constraints pertaining to internal politics have slowed down inclusiveness. Hence, the institutional environment and infrastructure are essential for ST&I in the region.

The sixth article by Dhiman Mondal and Kaustuv Chakrabarti titled “India’s Research Collaboration Trend with the selected African Countries: An Exploratory Study” is an in-depth analysis of India’s collaboration with selected African countries. India is one of the emerging economies that has significant S&T relationships with many African countries. The study has analysed India’s collaboration with selected African countries in various subject areas.

The second part of the special issue deals with various case studies.

In this line, the first article by Vusumuzi Malele titled “From Science, Technology, and Innovation to Creativity, Innovation and Entrepreneurship Indicators’ Framework for the Academic Promotion with impact on Socio-Economic Development” has discussed the case of promoting academicians in various positions in Africa. The author has proposed a two-way approach in academic promotion, for example, promotion focusing on (i) research and development, community engagement, and teaching components; and (ii) teaching, creativity, innovation, and entrepreneurship. The author proposed the QTRCP framework (Qualifications (Q), Work/Teaching experience (T), Research and Development

experience (R), Community Engagement experience (C), and Professional Bodies Membership (P)) for academics in various positions in South Africa.

The second article in this section is written by Olawale Olaopa titled “Utilizing Federalism, Science, and Technology for Economically Viable United States of Africa”. The author has observed that real federation and sustainable economic development for global competitiveness in Africa can only be achieved through sincerity, trust, and political will on the part of the leaders, people, and respective countries. The author further emphasized the role of stakeholders’ readiness to redirect all the regions’ resources leveraging on effective channelization of indigenous knowledge (IK) towards the development of STI driven by effective policy formulation and implementation.

The article by Kedibone Phago and Tichaone Mazarire titled “Policy Imperatives for African Science, Technology and Innovation: An analysis of Namibia and South Africa” is a comparative STI policy study of two Southern African countries. The study has observed that the 1% threshold recommended by the AU policy STISA 2024 remains a difficult task to achieve. In the case of Namibia, its STI system requires time to mature and strengthen its institutional capacity. For South Africa, it is necessary to ensure that STI policy can broaden involvement for marginalised communities in rural and peri-urban spaces. The article concludes with a consolidation of key features of the discourse as embedded in the Critical Theory for STI interventions. The essence is to maintain societal interest and ensure that new value systems on STI are embraced and supported.

The final article in this issue is written by Sabuj Kumar Chaudhury titled “Innovation Ecosystem for Sustainable

Energy in Low-income Countries of Africa towards the Goal of the Agenda 2030 of the UNEP and the Agenda 2063 of the AU: A critical review” has investigated the Science, Technology and Innovation Policy (STIP) and programmes, S&T infrastructure, tertiary education, R&D investment, patent profiles for sustainable or clean energy from 2000–2020 in the four low-income countries of Africa, e.g., Burundi, Malawi, Mozambique, and Rwanda. The study have indicated how the development trajectory of the innovation ecosystem of these countries can be a root enabler to achieve the goals formulated in SDG-7 of the UNEP and the Agenda 2063 of the AU.

Concluding remarks

The various issues discussed in the special issues covering the science technology indicators, scientometrics analysis, and case studies will be helpful for students, researchers, policy, and decision-makers in government alike. As we progress towards achieving the Sustainable Development Goals (SDGs) by 2030, the evidence from the African region presented in this issue shows us the STI perspectives and pathways the region and countries strive to follow.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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