Strengthening research, promoting innovation through richer collaboration

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Executive Summary

Strengthening research collaboration has been identified as a core area of co-operation for India's G20 Presidency. This issue note was drafted in September 2022 as a submission to the Government of India on potential steps to accelerate this co-operation.

Issue I
Opening up access for easy transfer of peer-reviewed research

Background

Global response to the COVID-19 pandemic has demonstrated the societal benefits that can be reaped through the barrier-free sharing of scientific materials. The swiftness with which diagnostic tests, drugs and vaccines were designed, trialled and deployed depended on the research community sharing vital information about the virus.

Open science has positive externalities – reduce research costs, prevent duplication efforts and encourage more research. In 2021, UNESCO approved a set of Recommendations on Open Science, based on the principles of science as public good, open access to data and scientific knowledge, open access to practitioners and principles of inclusion, equity and diversity.

The Science, Technology and Innovation Ministers and/or Chief Science Advisors of the G20 members and invited countries, met in Beijing on November 4, 2016 and agreed to "encourage discussion on open science and access to publicly-funded research results on findable, accessible, interoperable and re-usable (FAIR) principles in order to increase collaboration on science and research activities"[1]. The commitment to open science was reiterated in 2021 through the Declaration of G20 Ministers on Leveraging Research, Higher Education and Digitalisation for a Strong, Sustainable, Resilient and Inclusive Recovery signed during the Italian Presidency. The Declaration re-emphasised the need for conducting research using FAIR

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[1] Statement of the G20 Science, Technology and Innovation Ministers Meeting 2016 Beijing
https://www.mofa.go.jp/mofaj/files/000205642.pdf

practices, while "respecting national and international regulations and observing academic and ethical principles and values". The Declaration also provided examples of potential best practices for encouraging wider research collaborations.

A few G20 members have put in mechanisms to implement open access to research, particularly research that is publicly funded. In 2018, a group of national research funding organisations, with the support of the European Commission and the European Research Council (ERC), announced the launch of cOAlition S, an initiative built around Plan S that aims for all their funded research to be made immediately accessible through open access journals[2]. Recently, the US White House also announced its intention to make all publicly funded research available without any embargo, starting from 2026[3]. India has also reiterated its commitment to open access, by proposing the "One Nation, One Subscription" policy under the draft Science, Technology and Innovation Policy, 2020.

Building on these publicly-made commitments, the Indian Presidency aims to reinforce the need for open science and create mechanisms to scale open science initiatives amongst the G20 partners. The G20 partners house the most prolific countries involved in scientific publishing and also the leading academic publishing houses. This positions the G20 to take effective action for implementing open access initiatives that can benefit not only member nations, but researchers and science enthusiasts all over the world.

Challenges to Achieving Universal Open Access

There are three major gaps in achieving Universal Open Access:
(i) Researchers prefer to publish in high impact journals because their credibility and career progress, such as obtaining funding or tenure is evaluated on the basis of the impact factor of the journals they publish in. Many of the high impact journals are not open access, although the publishing houses may have sister journals of an open

[2] https://www.coalition-s.org/about/
[3] Tollefson J and Van Noorden R. US government reveals big changes to open-access policy 2022. Nature News. https://www.nature.com/articles/d41586-022-02351-1

access nature. Thus, the incentive for researchers is to publish in high impact journals, not necessarily open access, unless mandated by the funding agency.

(ii) Open-access publishing comes at a high cost, since authors have to pay an article processing fee which may offset the subscription fees that the journal would have otherwise collected. This raises the cost of publishing, that has to be met by the author and/or funding agency. In developing countries, where fundamental science remains underfunded, this increased price can come at the expense of conducting research itself. Conversely, these countries would most benefit from research being made open-access. Hence, it is important to consider the cost of open-access initiatives while creating implementation mechanisms.

(iii) A majority of scientific publishing occurs in English, and even when published in subscription-free journals may not be universally accessible to non-English speakers. The G20 partners amongst themselves speak multiple languages and should lead an effort to ensure scientific content becomes available across as many languages as possible.

Proposed Deliverables and Objectives

The G20 India Presidency aims to strengthen the G20's commitment to open science and develop concrete proposals to implement the common agenda of achieving open access by 2030.

1. Ministerial declaration on science being a public good

On an immediate basis, renewed collaboration between the G20 countries to achieve open access for all is necessary. The COVID-19 pandemic has highlighted that responding to future emerging challenges can be achieved in a world where scientific advances can be freely shared. The G20 should **acknowledge that science is a public good** and strive to make all publicly funded science open access.

2. An Actionable Framework for Achieving Open Access by 2030

While funding open access publishing is one way to achieve open science, the increased cost may not be affordable to all countries. In developing countries, the G20 should regenerate political momentum to advance the global agenda to achieve open access. A G20 endorsed framework for achieving open access should tackle the challenges created by publisher monopolies and lack of funding.

3. Adopt and update the UNESCO's recommendations on open science

The G20 can endorse the UNESCO recommendation on open science and include the need for breaking language barriers as a key principle underpinning open science.

4. Agree on mechanism to monitor impact of open access

While the potential benefits of open access are well known, its impact once implemented needs to be assessed. The G20 can negotiate on a mechanism that will allow for the impact to be assessed globally, so that further steps to make science more open can be taken if needed.

Key Questions for Discussion

1. What are the main barriers for developing countries to fund open access publishing? How do we address these barriers?
2. How would publishing houses respond to a global switch to open access publishing?
3. How would recruitment of researchers across countries be impacted if funders drive more open access publishing as opposed to impact factor–based publishing?
4. How can the impact of open access be measured?

Issue II

Increasing accessibility to research conferences and meetings for developing countries and LDCs

Background

Research collaborations also need in-person attendance at conferences or at collaborator sites to meet peers and/or conduct research. Intermingling of researchers is essential for scientific discussions, exchange of research materials and network for scientific progress.Hassle-free travel of researchers underpins the sharing of ideas and collaborating for research.

However, researchers of the global south suffer from having to repeatedly apply for visas to attend short term meetings/conferences. Pre-pandemic researchers from developing countries faced challenges in travelling to international locations because of time, effort and cost required for visa application and processing[4]. These conditions have been exacerbated by the COVID-19 pandemic, with researchers being left with long waiting times for visas appointments[5]. This has led to researchers missing out on key international meetings because of lack of visa. The arduous visa application process may also act as a barrier for researchers considering short stints in laboratories outside of their country, as there is a high opportunity cost for the time spent on putting together the application.

Most international meetings being held in the US and Europe also means that researchers from other countries have to cover for airfare and accommodation costs. Since the currency of countries in the global south may be relatively weaker, travel

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[4] Waruru M. African and Asian researchers are hampered by visa problems. 2018 Nature News. https://www.nature.com/articles/d41586-018-06750-1

[5] Nair A. As international students worry about visas, read what experts think are reasons for the delay. 2022 The Free Press Journal https://www.freepressjournal.in/education/as-international-students-worry-about-visas-read-what-experts-think-are-reasons-for-the-delay

for conferences or sabbaticals becomes expensive for these researchers. Combined with low research funding, this additional travel cost becomes a barrier for researchers to meet with their peers.

Consequently, the disparity in representation of researchers from the global south may lead to under-reporting of scientific findings from their research and perpetuation of helicopter research by other researchers[6].

It is imperative that the G20 partners work together to alleviate this disparity in accessing key research expertise and materials. The requirement of visas and travel checks can be solved through diplomatic commitment to treat all researchers equitably for the betterment of science collaboration and global scientific research.

Proposed Deliverables and Objectives:

The G20 India Presidency aims to create roadmaps for improving accessibility of researchers to international meetings/collaborations.

1. Ministerial statement on commitment to hassle-free travel for researchers by 2030.

The G20 partners can together agree on the need for hassle-free travel for researchers attending international meetings or engaged in international collaborations.

2. Roadmap for scientific visa for G20 researchers by 2030.

India can develop and present a roadmap for the inclusion of a scientific visa category for G20 researchers. This will include a framework for assessing country wise visa requirements and creating alternative visa pathways for researchers to improve access. Alternative pathways could include visa fee waivers, shorter processing times or long-term multiple entry visas for attendance of annual meetings.

3. Statement agreeing on holding more conferences in developing countries.

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[6] Haelewaters D, Hofmann TA and Romero-Olivares AL. Ten simple rules for Global North researchers to stop perpetuating helicopter research in the Global South. PLoS Comput Biol. 2021 Aug 19;17(8):e1009277. doi: 10.1371/journal.pcbi.1009277.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8376010/

Government led agencies are primary funders of research and research meetings. The G20 partners could agree to fund and arrange more meetings in developing countries to enable all researchers to participate in the discussions.

Key Discussion Questions

1. How do countries balance diplomatic visa requirements with the need to expedite scientific visa processes?
2. How to strengthen the scientific visa process to reduce any misuse?
3. How to create opportunities for collaboration/meetings in developing countries/LDCs?

Issue III

Creating regional consortiums to collaborate over research specific target areas

Background

The G20 countries amongst themselves hold expertise, material resources and financial resources to varying degrees. The COVID-19 pandemic has demonstrated that bilateral and regional multilateral relationships can help achieve key outcomes quickly, as compared with behemoth global organisations.

The UNESCO Science Report: towards 2030 highlighted that by 2014, 86% of scientific articles were the fruit of international scientific collaboration in low-income countries (compared with 82% in 2005); ~38% in lower middle-income countries (up from 32% in 2005). In high-income countries, one in three (34%) articles had a foreign co-author by 2014, up from 28%[7].

Multilateral groups of countries (2-4 countries) can share resources and expertise to address target problems. Such consortia can use resources optimally and reduce research costs and time. For example, countries with coastlines can work together on challenges such as harnessing tidal energy or management of ocean pollution. Countries with specific endemic diseases can work together for drug and vaccine discovery. Neighbouring countries can partner for the understanding of best practices for monitoring emerging diseases.

These groups can help build capacity, ideate on new research strategies, pool resources and bring diversity in approaching research problems. The G20 can offer a

[7] UNESCO Science Report: Towards 2030. Published in 2015 ISBN 978-92-3-100129-1 http://uis.unesco.org/sites/default/files/documents/unesco-science-report-towards-2030-part1.pdf

platform for identifying like–minded partners interested in researching similar research questions.

Key Deliverables and Objectives

1. Platform to identify like–minded partners and research questions

India can propose a mechanism to share information about specific research areas, participating institutions and resources they can share. This platform can act as a basis for identifying like minded partner countries and institutions.

2. Best practices for setting up collaborations

India can create a list of best practices for setting up multi–partner collaborations across various G20 partners.

3. Statement of commitment

G20 partners can identify key research areas in the immediate, medium and long term that are of interest and that the partners can commit to researching.

Key Questions for Discussion

1. What are the challenges for establishing international partnerships for targeted research?
2. What new opportunities for research can be generated because of sharing of resources?
3. Can there be shared funding agencies set up to fund collaborative research?

Issue IV
Securing research supply chains

Background

Many countries outside of the US and EU suffer from obtaining laboratory associated reagents in a timely manner. The pandemic further highlighted the dependence of researchers on products being manufactured in a few countries. Laboratories around the world had to contend with supply shortages and particularly manage increased diagnostic demand with reduced materials.

Ease of research collaborations will depend on easy access to research materials and laboratory reagents. Recently the US President Biden signed an Executive Order to launch a National Biotechnology and Biomanufacturing Initiative that essentially recognises a dependence on foreign materials and recommends that US manufacture for its own requirements in the field of life sciences and healthcare[8].

All countries within the G20 may not have the necessary resources to indigenously manufacture all research materials, but supply chains can be simplified to alleviate issues of access and cost. This could include simplifying customs for research products being shipped to credible institutions, a G20 priority shipping and custom clearance protocol and incentivisation of private companies to diversify their manufacturing locations.

Key Deliverables

1. A Framework to ease access and supply of research materials

India could propose a framework for easing shipment of research materials to credible research institutions including priority custom clearance protocols, reduction in taxes and priority shipping.

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[8] White House Briefing. 2022 https://www.whitehouse.gov/briefing-room/statements-releases/2022/09/12/fact-sheet-president-biden-to-launch-a-national-biotechnology-and-biomanufacturing-initiative/

2. A taskforce to understand supply chain issues and their resolution
India, with other countries which face similar challenges (e.g. Brazil) can form a
taskforce that can help create solutions for the existing supply chain issues and make
recommendations

Key Questions for Discussion

1. How to balance ease of supply chains with the need to secure them against
    possible terrorism attacks?
2. What new opportunities can be created by diversifying supply chains? What
    possible challenges would have to be addressed?