

Academic Collaborations in Asia: With Special Emphasis on India

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Abstract

No country enjoys a monopoly on the production and transaction of knowledge. Academic collaborations among countries and between institutions have increased in recent decades. The reason seems to be that papers co-authored with international academics are not only cited more often but also have higher impact than single author publications. This article shows that although the Asian countries have a tendency to look westward, academic collaborations among higher education institutions in these countries are on the increase. These have evolved in three distinct but related stages: a) collaborations for national capacity development; b) collaborations as part of the globalisation process; and c) collaborations to enhance academic credibility and national institutions' global ranking. The article also discusses the emergence of new institutional structures to promote regional collaborations and the role of diaspora in promoting research collaborations in the region.

Résumé

Aucun pays ne jouit d'un monopole sur la production et la transaction des connaissances. Les collaborations académiques entre pays et entre institutions se sont multipliées au cours des dernières décennies. La raison semble être que les articles co-écrits avec des universitaires internationaux sont non seulement plus cités, mais ont également un impact plus important que les publications d'un seul auteur. Cet article montre que si les pays asiatiques ont tendance à se tourner vers l'ouest, les collaborations académiques entre les établissements d'enseignement supérieur de ces pays se multiplient. Celles-ci ont évolué en trois étapes distinctes mais liées : a) collaborations pour le développement des capacités nationales; b) collaborations dans le cadre du processus de mondialisation; et c)

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collaborations pour améliorer la crédibilité académique et le classement mondial des institutions nationales. L'article traite également de l'émergence de nouvelles structures institutionnelles pour promouvoir les collaborations régionales et du rôle de la diaspora dans la promotion des collaborations de recherche dans la région.

Research collaboration and knowledge production

Knowledge is a global public good (Stiglitz, 1999). Although most institutions that produce knowledge are national, the knowledge crosses national boundaries (Bourne, 2000) and enjoys universal appeal. Knowledge production traditionally relied on universities and their research and development (R&D) activities. Given that they are publicly funded, they focused on basic research (OECD, 1999). This approach is aligned to Mode 1 knowledge production. However, it is increasingly recognised that knowledge is produced collaboratively. Unlike Mode 1 knowledge production which is discipline-focussed, individually-based and university-centred, Mode 2 knowledge production is transdisciplinary, heterarchical and group-based (Huff, 2000; Gibbons et al., 1994). It thus offers more scope for collaborative research and knowledge production.

Neave (2002) notes that the major share of R&D activities has been undertaken in universities in developed countries like the United States (US) and United Kingdom (UK), national organisations such as the Centre National de la Recherche Scientifique (CNRS) in France or national academies independent of the higher education system as in the former USSR. However, in all instances, it was carried out in collaboration with non-university R&D institutions.

Not only the patterns but also the capacity for knowledge production vary among countries, leading to a knowledge divide. The UNESCO Science Report of 2021 notes that countries in the North American region have the highest number of researchers per million people (4 432), while those in the South Asian (263) and African regions (124) have the lowest. Furthermore, countries such as China and India, with the largest higher education sectors, remain at the lower end with 1 307 and 253 researchers per million people, respectively (UNESCO, 2021).

Nobel Prizes are awarded to those who make a substantial contribution to knowledge production through their engagement in basic research. Disparities in the distribution of such prizes may be a good

indicator of variations in national capacity for knowledge production. An analysis of the countries of origin of Nobel laureates indicates that they are concentrated in selected developed countries which have a high density of researchers. According to the Nobel Prize Foundation, 40% of the 1 975 prizes awarded to individuals and institutions in the 120 years of its existence were awarded to Americans, with a large proportion of the remaining ones being conferred on Europeans. It is important to note that more than 25% of the research scientists working in the US are from other countries. Similarly, about 35% of all US recipients of Nobel Prizes have been immigrants to that country. This suggests that research collaboration and eventual migration have assisted the US to establish and retain its supremacy in scientific research and innovation.

Cross-border collaboration and co-authored publications have become an increasing trend in R&D activities. In 2017, nearly 60% of articles in the *Nature* Index were the result of international collaboration (Wagner et al., 2019). Aman and Botte's (2017) analysis of 92 820 articles found that the proportion of articles produced through international research collaboration increased from 14.1% in 2002 to 21.7% in 2013. One of the incentives to collaborate is that co-authored papers, especially those involving cross-border authors, are cited more often than single authored publications. Furthermore, multiple author papers are more likely to be accepted for publication by high-impact journals (Wyne, 2015). A major share of the scientific papers published in the US, UK, France, Germany, Australia, New Zealand and Canada is co-authored. The figures for the Asian region are lower, with China at 23% and India at 18.9% (UNESCO, 2021).

A further trend is that the traditional mode of knowledge production that emphasises basic research and disciplinary boundaries is giving way to application-oriented and trans-disciplinary research (Nowotny et al., 2002). The quest to secure favourable world rankings has led to universities paying more attention to research. Moreover, corporate funding pushes many institutions to focus on application-friendly R&D activities to foster innovation and economic growth (Hawkins, 2015).

No country enjoys a monopoly on the production and transaction of knowledge. Academic collaborations among countries and between institutions have become necessary to ensure a broad base for R&D activities and knowledge production. This article analyses Asian

universities and higher education institutions' initiatives to promote academic collaboration. In general, the countries in this region have looked to the West for academic orientation and collaboration. However, more recently, many have started establishing collaborations with countries within the same region. In other words, regional academic collaboration is an emerging trend in the Asian context. This article analyses some of the features of such collaboration.

The following section examines trends in Asian countries' international collaborations with regard to R&D. Section three presents a detailed discussion on strategies to promote such collaborations, while section four focusses on the government of India's initiatives to strengthen academic collaboration. This is followed by a brief discussion on the funding of these efforts in section five. The final section draws conclusions.

2. Asian countries and international academic collaborations

Surveys on internationalisation conducted by the International Association of Universities (IAU) (Eggen-Polak and Hudson, 2014; Marinoni, 2019) have found that North America and Europe are considered priority regions for academic collaboration by all other regions, including Asia. Thus, less-developed and Asian countries have looked westward. Most academic collaborations forged by institutions in Asian countries have been with higher education institutions in Europe and the US. It is also interesting to note that IAU surveys show that Asia and the Pacific is the top priority region for North American collaborations and the second most important for European institutions.

Asian countries' international academic collaborations evolved in three distinct but related stages: a) collaborations for national capacity development; b) collaborations as part of the globalisation process; and c) collaborations to enhance academic credibility and national institutions' global ranking.

Collaborations to develop national capacity

The initial focus of international academic collaborations was promoting higher education development in many less-developed countries. This involved establishing higher education institutions as well as training teachers to transact curriculum and promote research. While the former

involved cross-border flow of funds to build facilities, the latter often involved cross-border flow of students under study abroad programmes. Developed countries and funding agencies regarded international cooperation and collaborations as an extension of foreign aid and technical assistance which played an important role in the development of higher education in less-developed countries (Varghese, 2010). This was part of a strategy to create a competent state by nationalising and indigenising development (Atal, 1995). Multilateral agencies such as the World Bank and the European Union (EU), and bilateral agencies in countries such as the US, Canada, France, and the UK as well as private foundations played a supportive role in creating higher education facilities in many less-developed countries and training their future teachers in developed countries' universities.

Various scholarship programmes were crucial in promoting cross-border flow of Asian students. The USAID and the Fulbright programmes, Colombo Plan, British Council and Commonwealth scholarship programmes, and the German Academic Exchange Service, commonly known as DAAD, are examples of initiatives to promote cross-border education (Altbach and Knight, 2006). Funding support for student mobility was part of the projects mediated through government-to-government cooperation programmes (Knight, 2006). Non-governmental agencies also played a role in some countries, especially in Africa. In some instances, foreign private funding of research accounted for a major share of national R&D funding.

At this stage, the priority was knowledge transaction to develop teachers and create national capacity to offer higher education programmes. Countries such as Malaysia, Pakistan, and India sent a large number of students to the UK and US for Master's and doctoral programmes, to prepare them to become faculty members back home. One of the factors that promoted international collaboration was the fact that the leaders of the majority of newly-independent countries (57% of the 113 countries surveyed) had been educated abroad (Spilimbergo, 2009) and realised the advantages of collaborations with developed countries to develop national capacity. Such collaborations also assisted newly-independent Asian countries to develop national capacity to prepare policies and plans, and to create institutional infrastructure to educate citizens at university level. Many international agencies such as USAID supported infrastructure

development in less-developed countries, especially during the post-independence period (McMaster et al., 2019).

Collaborations for the global market

The emergence of the knowledge economy shifted the focus of educational priorities from national concerns to global markets. Science, technology and innovation became the driving forces to create knowledge and employ it to enhance economic growth and national competitiveness. Economic globalisation stimulates the internationalisation of knowledge production, giving rise to academic globalisation. A further aspect of R&D activities in the context of globalisation is the establishment of centres of excellence within universities (OECD, 1999) that conduct research in critical economic fields. Many research collaborations were facilitated through such centres.

Reduced public funding and support accompanied by outsourcing of services compelled many institutions and academics to seek alternative support. Knowledge production for industrial use became an attractive and rewarding investment for the private sector. The globalisation process and the advent of the Internet fostered the rapid expansion of cross-border research collaboration, as is evident in the growing number of collaborative publications (Marginson, 2018).

Knowledge production to promote economic growth and social development enhanced universities' relevance. The skills and know how required to compete in knowledge economies were different from those needed in manufacturing-based economies. Therefore, the traditional framework of knowledge production centred around the public sector gave way to market interventions. Knowledge production, especially in developed countries, is critical for economic progress and it has become an important corporate concern (Sanyal and Varghese, 2007). Consequently, corporate investment in R&D activities and knowledge production has increased.

The orientation of R&D activities shifted from the traditional focus on discipline-based basic research to trans-disciplinary approaches. This opened the door to collaboration among researchers from different disciplines and between universities and scholars from across the world (Nowotny et al., 2002). The notion that international collaboration promotes innovation through the exchange of ideas and perspectives gained traction. Multi-national corporations' R&D departments also

sought collaborations, especially in domains such as computer technology, pharmaceuticals, electronics, chemicals, and automobiles.

Knowledge production thus became a market-mediated activity to promote skills production for the global labour market. Many collaborative arrangements have been motivated by economic interests and their revenue-generating capacity (OECD, 2008). Market-based and commercial approaches have given birth to franchising and twinning arrangements, the establishment of branch campuses and promotion of cross-border student mobility. Cross-border student mobility's revenue-generating capacity has made it an attractive option for many universities in the developed world. The academic prestige of universities in the host countries as well as post-study employment opportunities abroad encouraged many Asian households to opt for their children to be educated in developed countries (Varghese, 2021). Not surprisingly, the major student sending countries were in Asia, with China, India and the Republic of Korea topped the list for a long period of time. This pattern was different from the earlier period when most study abroad programmes were supported by scholarship programmes and most graduates returned to their home countries.

Student mobility, especially for doctoral and post-doctoral studies, and teacher mobility are at the centre of research collaborations. For example, 1 093 Indian students were enrolled in doctoral programmes in Australia and nearly 17 000 in such programmes in the US in 2016 (Go8, 2017). Similar trends are apparent in the UK and other countries. It should be noted that research collaborations, especially in the fields of science, technology, engineering and mathematics (STEM), offered national benefits to participating countries. The globalisation of scientific research broadened the pool of researchers with different backgrounds (Hwang and Ahrens, 2020). International cooperation in the context of globalisation is evident in the dramatic rise in both the number of internationally co-authored publications, and such articles as a proportion of all those published in scientific publications (Marginson, 2018).

Collaborations to improve the ranking of national institutions

In recent years, higher education institutions have pursued international academic collaborations in order to enhance their academic credibility and global recognition. Such collaborations offer access to specialised

knowledge and research facilities, increased academic credibility and the global visibility of individuals and institutions. The launch of the Academic Ranking of World Universities (ARWU) in 2003 and the Times Higher Education (THE)-QS ranking in 2004 prompted universities to seek ways to improve their global ranking. For example, most countries in Asia were worried about their institutions' low ranking. In September 2005, Malaysia's top two universities slipped by almost 100 places (Hapsah, 2011). The responses varied from criticism of the methodology to strategies to strengthen R&D activities. Some Asian countries also started their own national rankings.

The establishment of world class universities (Salmi, 2009) became a priority in many Asian countries. It was recognised that research is important not only for knowledge production but also to attain academic credibility. China's Ministry of Education launched 'Project 211' and 'Project 985' to promote research universities, while India adopted a programme to establish 20 world class Institutions of Eminence (IoE) in the public and private sectors. The Brain Korea 21 (BK21) project and the Centre of Excellence in the 21st Century (COE21) initiatives in Japan focus on R&D activities to enhance higher education institutions' academic credibility. Such initiatives encouraged collaborative efforts with higher ranked institutions.

Furthermore, lower ranked Asian institutions have been eager to collaborate with higher ranked institutions abroad. International publications are important to improve global ranking, and research collaborations with high-ranking universities help to increase the number of international publications and position on the rankings. India's National Policy on Education 2020 (NEP 2020) recommended that universities ranked within the top 100 establish branch campuses. Many universities' mission statements include international cooperation and collaboration and offices or administrative units have been set up to promote such cooperation (Al-Youbi et al., 2020). Thus, pressure on national universities to improve their global ranking led to concerted efforts to enhance the quality of higher education, and the number and quality of publications. Global ranking became an accepted benchmark to measure the success of research and knowledge production. Combined with innovations in communication technologies, this resulted in the rapid expansion of cross-border research collaboration. The COVID-19 pandemic increased reliance on technology and the use of online interaction for collaboration.

Regional academic collaborations in Asia

Historically, the East always looked to the West for academic collaborations. This is changing and cooperative projects and research collaborations are slowly but steadily moving towards countries within the region. It is interesting to note that regional cooperation in higher education development is a growing phenomenon in both developed and developing countries (Varghese, 2015). Paradoxically, increased global competition in higher education has facilitated increased cross-border cooperation at the regional level.

The concept of 'regionalisation' of higher education has gained considerable attention in recent years, particularly in light of the Bologna Process which was followed by the establishment of the European Higher Education Area (EHEA) made up of 46 countries. Similar efforts towards regional cooperation have been seen in Latin America where the Inter-American Organization for Higher Education initiated a programme to create a Latin American and Caribbean Higher Education Area. Furthermore, 15 West African countries signed an agreement to promote intra-regional student mobility. This is not a common trend in the Asian region.

Across Asia, multiple organisations have promoted cross-border collaborations through the Association of Southeast Asian Institutions of Higher Learning, the Association of Southeast Asian Nations (ASEAN), Asian University Network (AUN), the Asia-Pacific Quality Network, and the South East Asia Ministers of Education Organization's (SEAMEO) Regional Centre for Higher Education and Development (RIHED). These generally include collaboration around issues of teaching, research, student and staff mobility, and quality assurance (Sakamoto and Chapman, 2010).

International student mobility programmes promote collaborative research. These include the Collective Action for Mobility Program of University Students in Asia (CAMPUS Asia) initiated by the governments of China, Japan and South Korea, the Asian International Mobility for Students (AIMS) programme spearheaded by the SEAMEO/RIHED and the ASEAN Experiential Learning Programmes (AELP) offered by the ASEAN AUN.

South Asian countries account for nearly 5.8% of global scholarly output and India accounts for nearly 88% of South Asian research contributions. South Asian countries, especially Bangladesh, Sri Lanka

and Nepal rely heavily on international collaborative research and this is reflected in their publications (World Bank, 2019). Asian countries have also witnessed a proliferation of R&D institutes independent of universities. The Council for Scientific and Industrial Research (CSIR) in India, the Rubber Research Institute (RRI) of Malaysia, the Metal Research and Development Centre (MIRDC) in the Philippines, and the Singapore Institute of Standard and Industrial Research (SISIR) are examples of institutions that are free to establish collaborations with other research institutions/universities within or outside the country.

In 2012, the Japanese Ministry of Education, Culture, Sports, Science and Technology and the governments of Japan, Korea and China jointly launched CAMPUS Asia. Characterised as somewhat of an Asian version of Europe's Erasmus Programme, it enables student exchange among the countries for short-term studies (a semester) and full-degree programmes. The objective is to establish a higher education network among universities in these countries in order to improve the region's competitiveness in the global academic market and to nurture the development of future global leaders. The AIMS programme promotes student mobility opportunities within Southeast Asia. It emerged from a pilot project involving Malaysia, Indonesia, and Thailand in 2009, and has now been opened to other countries in the region.

The Japan Society for the Promotion of Science (JSPS) became an independent administrative institution in 2003 to promote research and international collaborations. It supports research in all fields of the natural sciences, social sciences and humanities. Its programmes aim to create world-class research hubs within the Asian region and to foster new generations of talented young researchers with both discipline-specific knowledge and communication skills to engage in international collaborative research. The society encourages cross-border research collaborations for cooperative research with colleagues in Japan under the guidance of a senior host researcher. Innovative Asia is another programme initiated by the Japanese government to promote mobility among Master's and doctoral students at Japanese universities. It also offers internship opportunities at Japanese companies, research institutes or government organisations, mainly in the areas of science and technology.

The National Research Foundation of Korea (NRF) was established as a funding agency in 2009. It collaborates with many institutions

outside the country and offers full funding support for the collaborative programmes it initiates. Its Post-Doctoral Fellowship Program for Foreign Researchers targets PhD holders from Indonesia, Mongolia, Philippines, Thailand, Vietnam, Egypt and Tanzania. Another programme established in 2005 aims to create world-class research hubs within the Asian region; this programme is jointly funded by the JSPS of Japan, the NSFC of China and the NRF of Korea

International scientific co-publications are a well-established measure of cross-border research collaboration output. China's National Centre for Science Technology Evaluation (NCSTE) notes that such collaborations helped to increase the number of international publications to 71 000 in 2015, a fourfold increase from 2006 to 2015 (NCSTE, 2020). Most of these collaborations are in the fields of material sciences, engineering and computer sciences. Peking University, Shanghai Jiao Tong University, Tsinghua University and Fudan University play an important role in promoting cross-border collaborations. The Centre for South Asian Studies (CSAS) was established at Fudan University in 2007 to promote research with a focus on economic, political, diplomatic and security issues in South Asian countries.

A number of collaborations between China and the US are among Chinese scientists and Chinese-American scientists living in the US, with the latter tending to be favoured in the co-authorship network. These collaborations have helped China to achieve its place in the top 1% of cited publications in the sciences and engineering (Wang et al., 2013; Hwang and Ahrens, 2020). The other major countries involved in collaborations with China are Malaysia, Iran, India, the UK and Japan. These are mainly in the domains of physics and astronomy, chemistry, agricultural and biological sciences, engineering, health professions and computer sciences (Cheng et al., 2013). The Chinese Academy of Sciences (CAS) and the Indian National Science Academy (INSA) have been collaborating since the 1980s when they set up an exchange programme for scientists. Several individual faculty members from universities in both countries also collaborate.

India has also established several collaborative programmes through its diaspora. Recent programmes launched by the government of India have attracted many Indians settled abroad. It is estimated that around 100 000 Indian professionals apply for US work visas every year (UNDP,

2001) and Indians qualify for a major share of the H1B visa. According to the latest UN estimates, India has the largest diaspora of non-resident Indians (NRIs) and people of Indian origin (PIOs), a total of 31.5 million spread over 146 countries (UNESCO, 2018; UN, 2019). This is a good source of on-going international academic collaborations.

Through its targeted '211' and '985' projects, China has invested heavily in the quality of higher education since the 1990s with a focus on research and graduate studies as well as support for leading universities. It can now boast of co-authored papers with researchers from 156 countries/regions (Liu et al., 2021). China has also improved its position in world university rankings, with Peking University now the highest ranked Asian university.

According to the *Nature* Index, Australia and Singapore have the highest number of collaborative publications in the region. Nearly 70% of publications in Singapore and more than 60% of those in Australia are co-authored, with China and Japan standing at nearly 30% and India at 25% (Cheung et al., 2021).

The percentage of scholars co-authoring papers ranges from 0.15% in both India and the region as a whole to 5-10% in Nepal, Afghanistan, Bhutan, and the Maldives. However, not only are papers produced through collaborations outside the region larger in number, they also have greater citation impact. As noted earlier, India accounts for nearly 88% of South Asia's scholarly contributions (World Bank, 2019).

Indian academic collaborations

International collaborations in the years following India's independence reflected the political commitment to technologically self-reliant economic and industrial development. The establishment of Indian Institutes of Technology (IITs), Indian Institutes of Management (IIMs), Regional Engineering Colleges (RECs) and several medical colleges reflected the government's commitment to self-reliance.

Many technological institutions such as the IITs were established in collaboration with foreign countries. The first, Kharagpur in West Bengal, was established in 1951 with support from foreign countries and it attracted faculty members from the US and European countries. The IIT Bombay received experts and substantial financial support from the USSR through UNESCO, which also offered fellowships to train Indian

faculty members abroad. The IIT Madras received similar support and fellowships from Germany, while its counterpart in Kanpur was granted technical assistance by a consortium of nine leading US institutions to set up the institution, its academic programmes and laboratories. The IIT in Delhi was established with the help of the British government. Indian Institutes of Management were established in collaboration with the Harvard Business School.

Many first-generation professors in Indian universities were educated abroad and were exposed to global teaching practices and research. Today, many high-quality institutions have a relatively fair share of faculty members with teaching and research experience in reputed international universities. International collaborations occur through the establishment of facilities to enhance national capacity to produce highly qualified STEM graduates, and promote student mobility and migration of professionals.

India's 1968 and 1986 policies on education were relatively silent on internationalisation and international collaborations. During the 10th five-year plan (2001-06), the University Grants Commission (UGC) articulated the need for internationalisation focusing on cross-border flow of students and introduced a scheme, 'Promotion of Indian Higher Education Abroad (Pinhead)'. The Association of Indian Universities (AIU) formed a task force on internationalisation of higher education in 2004 and in 2009 the UGC prepared a plan for such. The 12th five-year plan (2012-17) included proposals for faculty and student exchange programmes and collaborations for teaching and research. It was also envisaged that an India International Education Centre (IIEC) would be created; however, it seems that this is yet to materialise.

Collaborations were also created through cross-border flow of qualified professionals. The CSIR maintained a National Register of Scientific and Technical Personnel from the 1940s and it included a section on 'Indians Abroad' in 1957 which showed that most highly-qualified Indians migrated to the US and other OECD countries. Many were graduates of prestigious institutions. It is estimated that more than 30% of graduates in STEM and 80% in Computer Sciences from prestigious IITs migrated to the US during the 1990s (GOI, 2002). Many set up research collaborations with colleagues in India.

Indian students that studied abroad during the period following independence mainly acquired degrees to become teachers in Indian

universities. In general, these study abroad programmes were supported by scholarships offered by the sponsoring countries. However, public funding and sponsored scholarships were replaced by household financial support and student loans. This is one of the reasons for the rapid expansion in the number of Indian students studying abroad, with a more than fivefold increase from 66 700 in the year 2000 to more than 330 000 in 2019, making India the second largest student-sending country after China.

Indian students abroad have traditionally been hosted by three countries – the US, UK and Canada - which together accounted for 85% of Indian students abroad in 1995. Although the US share declined from 78.5% in 1995 to 44.4% in 2018, the number of Indian students hosted by the country has increased and it continues to attract the largest number of Indian students. The new player on the scene is Australia which increased its share of Indian students from 5.2% in 2004 to 17% in 2018 (Varghese, 2021).

Canada's Post-Graduation Work Permit Program (PGWPP) and Australia's point-based immigration policy induced student flows and collaborative research activities between these countries and India. These mobility arrangements are promoted by India-US higher education dialogue, strategic partnership agreements between South Korea and India and research collaboration agreements between Canada and India in Science and Technology. Similarly, India has enjoyed Science and Technology collaborations with South East Asian countries since the 1990s. Strong collaborations exist with Malaysia in chemistry and with Singapore in the fields of engineering, technology and physics (Gupta et al., 2002).

The government of India offers fellowships to international scholars specialising in Indian studies through the Indian Council of Cultural Relations (ICCR). The Council has established 108 chairs of Indian Studies in various foreign universities including those in BRICS countries. The chairs in Hindi at Peking University, Beijing, in social sciences at Shenzhen University, Guangzhou and peace studies at the University of KwaZulu-Natal, South Africa are good examples (Varghese, 2015). The AIU has MOUs with university associations in many countries including the UK, Canada, France, Germany, the Netherlands, Australia, Singapore, and Taiwan. These agreements commit to mutual recognition

of qualifications, faculty and student exchange, staff development, collaborative research and publications, and infrastructure sharing.

A noticeable trend is that elite institutions in India seek to collaborate with elite institutions abroad. Collaborations in science, technology, and medical disciplines occur between institutions like the Indian Institute of Science (IISc), IITs, and AIIMS and elite foreign universities such as Harvard University, Massachusetts Institute of Technology (MIT), the Universities of Tokyo, Toronto, and Paris-Sud and the National University of Singapore. Some also maintain significant research engagements in humanities, arts, and the social sciences with universities such as JNU, University of Delhi, University of Hyderabad, Tata Institute of Social Sciences (TISS), Banaras Hindu University (BHU), Jadavpur University, Anna University, and the University of Pune.

Demand is increasing for collaborations with foreign higher education institutions. A study conducted in 2005 (Bhushan, 2005) found that there were 131 foreign-affiliated institutions in India; 59 of which partnered with universities in the UK and 66 with those in the US. Many of these collaborations involved offering courses, mainly in business or hotel management. By 2010, the number of foreign collaborations with Indian higher education institutions had increased to 631. The largest number of collaborating institutions were in the UK (158), followed by Canada (80) and the US (44) (AIU, 2012). However, many of the collaboration arrangements were not approved by the regulatory bodies and were operating without proper approval.

More recently, Indian institutions, mainly in the private higher education sector, have started establishing campuses abroad, either independently or in collaboration with existing national institutions. For example, the JSS Academy of Technical Education is an independent institution in Mauritius while the DY Patil Post-Graduate School of Medicine at Quatre-Burnes was established in partnership with the University of Technology, Mauritius (UTM) in 2009. An off-shore campus of Manipal University operates in Malaysia and Amity University operates campuses in the US, UK, China and Singapore. Four Indian private institutions are represented in the Dubai International Academic City.

For the first time, the national policy on education 2020 (NEP 2020) recommended the establishment of branch campuses of foreign universities in India. It is expected that such institutions should be among

the top 100 in world rankings. The credit transfer systems and Academic Bank of Credits created by the public authorities facilitate cooperation and collaborations with institutions abroad. As noted earlier, India aims to establish collaborations with top ranking institutions in developed countries and many of the government's recent initiatives reflect this interest.

Government initiatives

The government of India has launched several schemes in the recent past to promote international academic cooperation and collaboration with the intention of the country becoming an education hub. The 'Study in India' programme was launched in 2017 with provision for scholarships, while the Global Initiative for Academic Network (GIAN) was established in 2017-18 to attract foreign faculty members to teach for short periods at Indian universities.

The Scheme for Promotion of Academic Research and Collaboration (SPARC) aims to improve Indian higher education institutions' research ecosystems by facilitating academic and research collaborations between Indian institutions and the best institutions in the world in 28 selected nations. Envisaged activities include academic visits, workshops, collaborative research and joint publications. All Indian institutions ranked in the overall top 100 in the India Rankings of the national institutional ranking framework (NIRF) and their partner foreign institutions from the top 500 QS 2020 World University Ranking are eligible for such collaborations. With an allocation of Rs. 4 180 million for a period of two years (2018-19 and 2019-20), the scheme aims to support around 600 joint research projects.

Other initiatives to promote collaboration include the Scheme for Trans-Disciplinary Research for India's Developing Economy (STRIDE) to promote a trans-disciplinary research culture in Indian colleges and universities (UGC, 2019); IMPRINT (Impacting Research Innovation and Technology), IMPRESS (Impactful Policy Research in Social Science) and STARS (Scheme for Transformational and Advanced Research in Fundamental Sciences). The Consultative Group on International Agricultural Research (CGIAR), an international organisation with its headquarters in Montpellier, France works in collaboration with the Department of Agricultural Research and Education (DARE) and the Indian Council of Agricultural Research (ICAR). It has 15 research centres

across the world, including the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in Hyderabad, India.

The Department of Science and Technology (DST) under the Ministry of Science and Technology's International Cooperation Division implements science and technology agreements between India and other countries. Bilateral cooperation agreements are in place with 83 countries including Australia, Canada, the EU, France, Germany, Israel, Japan, Russia, and the UK and US. In association with the Academy of Finland, India's Department of Biotechnology has initiated bilateral research cooperation and researcher mobility, mainly at the post-doctoral level between the two countries.

The Indian Council of Social Science Research's International Collaboration Programme facilitates collaboration in the social sciences, including scholar exchange, and joint seminars, publications and research projects between Indian and international organisations and academic institutions.

The Indian Council of Medical Research relies on Indian missions abroad and foreign missions in India for international collaborations. Biomedical research features prominently in all bilateral agreements. There are currently 23 active MOUs/letters of intent (Kumar et al., 2020) that cover, *inter alia*: (i) exchange of scientific information; (ii) exchange of scientists/technicians for training; (iii) joint execution of scientific projects including support for the procurement of scientific equipment; and (iv) organisation of joint meetings, seminars, workshops and symposia in identified areas of cooperation.

The Commonwealth Government's flagship scheme, the Australia-India Strategic Research Fund supports research collaborations between higher education institutions in the medical sciences, biotechnology, and engineering. It also provides funding for international doctoral student scholarships at Australian universities, some of which are allocated to Indian students. A few universities have gone further in providing additional scholarships specifically for Indian nationals as part of their commitment to increase engagement with India and Indian higher education institutions. Some universities have used the government's New Colombo Plan scholarship scheme to organise undergraduate study programmes and internships in India (Freeman, 2017).

Financial resources for cross-border collaborations

The main sources of funding for international research are grants from international organisations and bilateral agencies, business enterprises and national agencies, and institutions' own resources. Public investment in R&D is declining in developed countries. Government's share of total funding of R&D decreased by four percentage points (from 31 to 27%) in OECD countries in the past decade (OECD, 2018). However, the public sector continues to play a dominant role in R&D activities in less-developed countries which lack both financial and human resources to promote research and knowledge production (Sanyal and Varghese, 2007). Funding is one of the major constraints in expanding international research collaborations. The fourth Global Survey by the International Association of Universities identified a lack of funding as the greatest barrier to internationalisation.

According to the UNESCO Science Report (UNESCO, 2021), global spending on research grew faster than the global economy between 2014 and 2018. This is partly due to the private sector's increased engagement in R&D. For example, 75% of R&D expenditure in Asian countries such as the Republic of Korea and Japan is sourced from business enterprises. However, both public and private sources are very limited in this region, especially among the poorer countries and those in the south east (World Bank, 2019).

The Asia Foundation's South Asia Small Grants Program extends funding to civil society organisations in five South Asian countries, namely, Bangladesh, Bhutan, Maldives, Nepal, and Sri Lanka. With its headquarters in San Francisco, the foundation operates through a network of offices in 18 Asian countries and Washington, D.C. Its programmes aim to strengthen sub-national governance; increase access to justice and build community security.

The Information Society Innovation Fund (ISIF Asia) supports efforts to develop technical capacity and/or research around Internet network operations and the Internet industry in the Asia Pacific region. A total of USD 295 000 is allocated under this programme across three grant types that support projects in different stages of development: small grants (two grants of USD 30 000); one scale-up grant (USD 85 000) and an impact grant (USD 150 000).

The ASEAN-India research training fellowship (AI-RTF) promotes the mobility of scientists and researchers from ASEAN member countries to

India to work at Indian R&D/academic institutions. India awards around 50 fellowships (ranging from two to six months) annually to young scientists and researchers in the priority areas of bio-medical devices related to the COVID-19 pandemic, nano-technology and advanced materials, cyber physical systems, artificial intelligence and ICT. Several scholarships for international students are offered through the Indian Council for Cultural Relations. The General Cultural Scholarship Scheme targets students at all educational levels in 54 countries, and represents one of the most inclusive scholarship funds offered by India. Other scholarships target key neighbouring countries in the region such as Bangladesh, Sri Lanka, and Nepal.

Support from the diaspora is another source of funding for international collaborations. China and India are best placed in this regard as a sizeable number of their citizens have settled abroad, many of whom are engaged in research organisations and occupy prominent professional positions. China has a number of programmes aimed at attracting overseas nationals to return to the country. In 1994, it launched the 100 Scholar Program, which by 2007 had recruited 1 417 scholars to return home. Local governments have designed additional policies to attract overseas Chinese nationals (Geng, 2012). The China Scholarship Council, a non-profit institution affiliated to the Ministry of Education, provides financial assistance to Chinese citizens wishing to study abroad and to foreign citizens wishing to study in China. The Chinese government grants approximately 20 000 scholarships annually to international students to study in China.

A common trend is that proposals are submitted jointly and it is believed that collaborative projects with universities from less-developed countries receive preference when it comes to funding. There are two types of collaborations and funding support. Institutions may approach national and international agencies for project funding which may include all activities to be carried out and compensation for staff time. The other financing model involves each participating institution meeting local expenses, while those incurred to participate in project meetings are met from international funds.

Concluding observations

The number of academic collaborations among countries and between institutions has increased in recent decades. One of the reasons seems to

be that papers co-authored with international academics are cited more often than single author publications and enjoy a larger share among high impact articles. This article analysed academic collaboration initiatives among universities and higher education institutions in Asian countries. The analysis showed that although these countries have a tendency to look westward for academic collaborations, recent trends point to increasing regional collaborative arrangements.

International academic collaborations in Asian countries emerged in three distinct but related stages: a) collaborations for national capacity development; b) collaborations as part of the globalisation process; and c) collaborations to enhance national institutions' academic credibility and global ranking. The experience of countries such as China shows that significant investment in promoting research in universities pays dividends and improves national institutions' global ranking. It would seem that it remains an aspiration, if not an obsession, to establish world class universities in some Asian countries. Regionalisation of higher education and research has gained considerable attention in recent years in Europe, Latin America and Africa. Unlike other regions, Asian countries have not yet created an Asian higher education area, although sub-regional organisations are active.

Academic collaborations in Asia are promoted through four different channels, namely, through public institutions established by national governments and programmes initiated by the public authorities, various networks and associations, R&D institutes that are separate from universities and are active in establishing networks and academic collaborations within the region and beyond, and through the diaspora.

It is safe to conclude that, despite active efforts to promote regional academic collaborations, the Asian orientation continues to be westward looking and seeks collaboration with top ranking institutions outside the region. Expanding this extra-regional collaboration network could enable South Asian countries to maximise the value of their relatively modest research bases and augment limited domestic resources. This is particularly relevant for research collaborations supported by multilateral financial institutions that promote extra- and intra-regional initiatives.

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