

Science and Technology in Vietnam, Indonesia, and the Philippines*

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When the South Korean President Moon Jae-in visited Vietnam, Indonesia, and the Philippines in 2017, the Blue House (Presidential Office) announced that the government would be implementing a “New Southern Policy” in its approach to international diplomacy, calling the visit a “tour of the VIP nations” (an acronym using the English names of the countries).¹ The New Southern Policy is the key axis of the South Korean government’s strategy to diversify its diplomacy, whereby South Korea’s trade with the member states of the Association of Southeast Asian Nations (ASEAN) is to be elevated to that with the G2 (the United States and China) by 2021. The policy is expected to cultivate Korea’s relationship with each of the three nations by encouraging economic cooperation as well as collaborative projects in the field of science and technology.

As a researcher working on the modern and contemporary history of science in Korea, I have long felt the need for comparative research on the trajectories of science and technology in South Korea and other Asian countries. Limitations of mono-national approaches have emphasized the necessity for international perspectives, which has led to an increased examination of diverse historical materials from abroad. Against such a backdrop, the Korean Research Institute of Science, Technology, and Civilization (KRISTaC) at Chonbuk National University (CBNU), which conducts research on “Science and Civilization in Korea” (SCK), has set the goal of moving beyond SCK and conducting a comprehensive, long-term study on “Science and Civilization in Asia” (SCA).² In addition, a three-month long stay of Thai Vinh Tran, a researcher on the contemporary history of science in Vietnam, as a visiting scholar at KRISTaC in 2017, has heightened our interest in the VIP nations including Vietnam. It can be said that this special issue is a direct outcome of Tran’s visit to South Korea.

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¹ “‘V. I. P’ mosimnida... Jungguk sujuneuro aseangwa gyoyeok hwakdae” (Welcoming ‘V.I.P’... Trade with the ASEAN to be expanded to the level of China), *Chosun ilbo*, Nov. 10, 2017.

² Brochure of Korean Research Institute of Science, Technology, and Civilization (2017).

In fact, there have been several occasions that led me to take full-fledged interest in science and technology in the VIP countries. The first was the establishment of the Vietnam-Korea Institute of Science and Technology (V-KIST) in 2017, which has so far been the largest project in South Korea's official development assistance (ODA) in the field of science and technology.³ The Korea Institute of Science and Technology (KIST) was established in 1966 partly with U.S. funds provided as a concession for the deployment of South Korean combat troops to Vietnam during the Vietnam War. A half-century later, the building of its sister institute in Vietnam naturally intrigued me as I had previously conducted research on KIST.

The second occasion was the question that a Filipino scholar posed to me at the biennial conference of the International Association of Historians of Asia (IAHA), held in Malaysia in 2014. His question was about the considerable differences in scientific development between South Korea and the Philippines, even though, up to the 1950s, the latter had been more developed than the former in its economy, as well as in science and technology. He opined that the difference was a result of the disproportionate technical aid provided by the United States to the two countries. Lacking sufficient information on that particular aspect of Philippine history, I answered that the international provisions at the time, including foreign technical aid, interacted with domestic factors such as the yearning and ambitions of South Korean scientists and engineers to promote science and technology, and South Korea's government policy had also played a vital role.⁴ Interestingly, a senior South Korean historian of science also recounts an experience similar to mine. A Filipino scholar had asked him: Why had South Korea and the Philippines yielded such disparate results in the development of science and technology even though the supreme leaders of the two nations [i. e., Park Chung Hee and Ferdinand Marcos] shared many of the same traits, such as being of the same age and having a military background? Even without recalling the fact that many South Korean agriculturists studied in the Philippines during the 1960s and 70s, the historical trajectories of science and technology in the Philippines and South Korea since World War II clearly form an interesting contrast.

Compared to Vietnam and the Philippines, more research has been conducted on the case of Indonesia, providing useful resources for comparison with South Korea.⁵ In particular, Sulfikar Amir's work on science and technology in Indonesia under

³ Nguyen Huong, "V-KIST: A Milestone in Science and Technology Co-operation," *Vietnam Investment Review*, March 23, 2018.

⁴ For a detailed answer, see Manyong Moon, "Postcolonial Desire and the Tripartite Alliance in East Asia: The Hybrid Origins of a Modern Scientific and Technological System in South Korea," in Hiromi Mizuno, Aaron S. Moore, and John DiMoia eds., *Engineering Asia: Technology, Colonial Development and the Cold War Order* (London: Bloomsbury, 2018), 173-176.

⁵ For a brief introduction to the major achievements on the history of science and technology in Indonesia, see Sulfikar Amir, "Reconstructing the Archipelago," *East Asian Science, Technology, and Society* 11:1 (2017), 1-7.

Suharto has stimulated my work on the history of science and technology during the Park Chung Hee era.⁶

Lastly, I have taught a course titled “Science and Civilization in the Asian Community” at Chonbuk National University since 2016, and all authors contributing to this special issue have either participated or will participate in the class as invited lecturers. In examining topics related to the history of science and technology in diverse Asian nations with a focus on East Asia, this course at its core promotes comparative studies to instill a deeper understanding of science and civilization in Korea. In the long term, the course is expected to lay the intellectual groundworks for the possibility that science and technology would play mediating roles in developing plans for the establishment of an Asian Community.⁷ Such personal experiences and considerations have constituted the backdrop in the production of this special issue.

An Overview of the Papers

This special issue seeks to examine contemporary science and technology in the three VIP nations. The first paper by Mohsin addresses the Overseas Fellowship Program (OFP) pursued under the so-called “New Order” Indonesia (1966-1998). Implemented under the initiative of Bacharuddin Jusuf Habibie, who oversaw developments in science and technology with full support from President Suharto, the OFP served as an important occasion for training highly qualified experts on science and engineering in Indonesia. In fact, President Sukarno (1945-1966) had sent thousands of students abroad to study science and engineering in the early 1960s, mainly to countries in the communist bloc such as the former Soviet Union, former Yugoslavia, and China. However, following the political cataclysm of 1965, a large number of these students were unable to return to Indonesia.⁸ Consequently, the OFP, implemented from 1985 to 1992, was a project indispensable to the mass-scale industrial and scientific and technological projects pursued by the Indonesian government. Of course, the fact that the prospective fields of study and foreign universities chosen for matriculation were determined not by the candidates themselves but by the state reminds us that this program was a policy implemented by an authoritarian regime. Other scholarship programs with similar functions implemented in 1992 were suddenly terminated amidst Suharto’s downfall and the Asian financial crisis

⁶ Sulfikar Amir, *The Technological State in Indonesia: The Co-Constitution of High Technology and Authoritarian Politics* (London: Routledge, 2013).

⁷ For more on the Asian Community, see One Asia Foundation ed., *Towards Asian Community: Peace through Education* (Fukuoka: Ashi-Shobo Publishing Co., 2018).

⁸ Anto Mohsin, “Science and Technology in Indonesia: A Brief Overview (1900 to present),” paper presented at Chonbuk National University, 2017.

of 1998, thus further highlighting the relative importance of the OFP. Though it may still be somewhat premature to evaluate the effects of this training of experts in accordance with Habibie's larger plan on state-led industrialization and the development of science and technology, Indonesia's OFP is a noteworthy topic when considering that many countries including South Korea similarly reinvigorated science and technology by dispatching students abroad on state scholarships.

Penned by Thai and Moon, the second paper surveys the contemporary history of science and technology in Vietnam. Systematic research on the topic is still insufficient; in particular, studies in the English language are rare. As hinted in the title of the paper, "Hybrid Origins of Modern Science and Technology System," the science and technology system in Vietnam is marked by the historical vicissitudes that the nation underwent. Despite changes in name and nature, science and technology-related institutions constructed during the French colonial era have survived to this day. Both the division of the nation into north and south following World War II and the fierce Vietnam War have left scars on the field of science and technology. In addition, the influence of the former Soviet Union, which did not stint in providing direct support to the former North Vietnam, became the most important driving force behind the development of science and technology in Vietnam following reunification. Throughout the Cold War, Vietnam had formed a Soviet-style science and technology system but this changed considerably after the implementation of *Doi Moi* ("Renovation") policy. Amidst active exchanges with diverse countries and a fervent pursuit of a comprehensive science and technology policy on the part of the Vietnamese government, science and technology in the nation rose quickly in competitiveness. Of course, still strong was the influence of bureaucratic control, and the nation has suffered from a serious brain drain due to the rapidly increasing popularity of study abroad among Vietnamese students. Nonetheless, new solutions to such problems remain within reach through exchange of ideas and steadfast dialogue, just as a panoply of factors have hitherto shaped contemporary science and technology in Vietnam.

Tracing the process through which science and technology developed in the Philippines in the twentieth century, Jeong's paper elucidates that science and technology were consistently seen as key to the construction of a "modern" state, from the colonial period to the post-colonial years, during which economic development was pursued by the government. Despite slight differences in their meaning between eras and between individual actors, science and technology in the twentieth-century Philippines were implemented under government leadership for the shared goal of constructing a "modern" state. The tenure of President Marcos, who came to power in 1965 and ruled for over 20 years until he was ousted through the "People Power" democratization struggle (1986), was no exception. Campaigns initiated during his presidency such as the National Science and Technology Week (NSTW) continue even to this day under similar names. Of course, it must be considered that Filipino scientists evaluate the Marcos era in a negative light: "the dictatorial presidency of

Ferdinand Marcos was stifling any critical inquiry, regardless of the regime's supportive rhetoric or funding for technocratic solutions."⁹ Though the Philippines has universities boasting their long history and high international esteem and possesses the potential to produce outstanding experts, there is a lack of sufficient material and institutional support that would buttress such factors. It is possible to pose research questions on the contemporary history of science and technology in the Philippines that are just as useful as those concerning the colonial period.

The three countries addressed in this special issue have the common historical thread of having undergone prolonged colonial rules and highly centralized, authoritarian regimes following liberation. Of course, disparate sociocultural backgrounds lie behind the historical memories shared by these countries. In addition, the three papers differ from one another in the research questions they pose and the approach they employ to seek the answers. Nevertheless, discussions on the history of science and technology in these countries in the twentieth century would expand the scope of research on the history of science and technology in Asia in general and subsequently serve as a starting point for future comparative studies with South Korea. In addition, an understanding of the contemporary history of science and technology in these countries is also necessary for the smooth implementation of technical cooperation with South Korea, an arena that has been active in recent years.

Relationships in Science and Technology between South Korea and the "VIP States"

International cooperation with diverse countries, including the United States, played an important role in the rapid growth of science and technology in South Korea. Various forms of international cooperation, such as technical aid provided before the South Korean government's full-fledged implementation of science and technology policy, served as the foundation of material, human, and institutional support necessary for the country's scientists and engineers to accumulate experiences and to engage in research activities.¹⁰ After decades of struggle for growth, South Korea in 2009 gained entry into the Development Assistance Committee (DAC) in the Organisation for Economic Co-operation and Development (OECD) and was officially acknowledged as one of the first transition cases of a recipient nation becoming a

⁹ Warwick Anderson, "Science in the Philippines," *Philippine Studies* 55:3 (2007), 310.

¹⁰ Think of the title of John DiMoia's dissertation, "*Hanmi hyŏpcho* (한·미 협조/ Korean-American Cooperation) and the Origins of South Korean State Science (1945-1975)," (Ph.D. Dissertation, Princeton University, 2007).

donor nation.¹¹

Notwithstanding the modest scale, South Korea also dispatched technical aid and expert training support to developing countries as early as the 1960s. Initiated in 1963 with funds from the U.S. Agency for International Development (USAID), technical assistance was rendered mostly by inviting engineers from the recipient countries to South Korea and providing technical training to them. The program began in 1963 with the invitation of eight trainees from developing countries, and from 1967, South Korea also dispatched engineers abroad to provide technical assistance. Over half of the recipients for technical assistance were from the field of public health. Although project aid including provision of equipment also began in the 1970s, it remained on a limited scale due to the burden of cost. Interestingly, overseas technical assistance in 1969 was provided to a total of 134 individuals: 24 were from the Philippines, taking up the largest share; and 14 each were from Indonesia and South Vietnam, sharing the second place.¹² Together with Thailand, the VIP countries have engaged most actively in technical cooperation with South Korea.

Scientific and technological collaboration and dialogue between Vietnam and South Korea can be traced back to the 1960s. South Korea's trade with South Vietnam increased considerably with the former's participation in the Vietnam War, and a large number of South Korean technical experts were dispatched in the process. Though diplomatic relations with South Korea were severed following the end of the Vietnam War, they were reestablished after the implementation of the *Doi Moi* policy in the late 1980s. Diverse projects in technical cooperation between the two nations have been implemented since the signing of the 1995 Agreement on Scientific and Technological Cooperation between the Government of the Republic of Korea and the Government of the Socialist Republic of Vietnam, and Vietnam's role has grown to such an extent that, as of 2018, 45% of Samsung Electronics' mobile phones are produced in Vietnamese factories. V-KIST held its groundbreaking ceremony in 2018, more than 20 years after the preliminary survey for the establishment of a research institute.¹³ V-KIST is expected to serve as a catalyst in solving the problems stemming from the bureaucratic nature of the research system and the brain drain in Vietnam today.

South Korea and Indonesia together have also implemented various technical cooperation projects since 1971, when the two countries signed the Agreement Regarding Economic and Technical Cooperation and Trade Promotion between the

¹¹ For South Korea's foreign aid, see Hisahiro Kondoh, "Korea's Pathway from Recipient to Donor: How does Japan Matter," in Jin Sato and Yasutami Shimomura eds., *The Rise of Asian Donors: Japan's Impact on the Evolution of Emerging Donors* (London: Routledge, 2013), 133-154.

¹² Gwahak gisulcheo, *Gwahakgisul yeongam 1970* (Seoul: Gwahak gisulcheo, 1970), 76.

¹³ Gwon O-Gwan et al., *Vietnam yeongu gigwan hyeongseong-e gwanhan sajeon josa yeongu* (A Preliminary Study on the Establishment of KIST Model Research Institute in Vietnam) (Seoul: Gwahak gisulcheo, 1996).

Government of the Republic of Korea and the Government of the Republic of Indonesia. In 2006, this status was elevated to that of “strategic partnership”; since then, the relationship between the two nations has fostered dramatic developments in diverse fields. As the foremost importer of South Korea’s defense equipment, Indonesia has purchased supersonic advanced trainers (T-50) and submarines from Korea and has implemented diverse mass-scale projects including the ongoing Korea Aerospace Industries KF-X/Indonesian Aerospace IF-X (KF-X/IF-X) between the two nations. State-led industrialization pursued under the Suharto administration, especially Indonesia’s project to modernize rural communities by classifying over 60,000 villages into three categories, implies a strong link with South Korea *Saemaul* (New Village) Movement in the 1970s. South Korea’s KIST model is known to have influenced Indonesia’s plans for a new industrial technology research institute in 1972, and Korea’s Minister of Science and Technology Choi Hyung Sup offered advice to Indonesia’s Minister of Research and Technology Soemitro Djojohadikusumo during his visit to Indonesia in 1975.¹⁴ Although many of the scientific and technological infrastructure buttressing the Suharto administration’s industrialization projects had been built during the Sukarno era, the industrial policy led by Habibie, who was a former aviation engineer and the nation’s Minister of Research and Technology for 20 years, enabled Indonesia to become one of the few nations independently producing aircrafts.

As for the relationship between South Korea and the Philippines in science and technology, the most classic case would be South Korea’s “green revolution” achieved through Philippines’ International Rice Research Institute (IRRI), an institute established in 1960 with support from the Ford Foundation and the Rockefeller Foundation.¹⁵ The IR667 rice cultivar (Tongil rice or “Unification” variety) was developed by a South Korean researcher while working at this research institute. IRRI granted South Korea self-sufficiency in the production of its staple crop. Florencio Medina, the chair of the Philippine National Science Development Board (present-day Department of Science and Technology, DOST), visited South Korea in 1975, and Minister Choi Hyung Sup in return visited the Philippines the following year to discuss plans for cooperation on science and technology between the two countries. Consequently, joint research projects in the fields of metals, underground resource development technology, and sericulture were initiated along with plans for the exchange of scientists and engineers. Medina and Choi discussed a wide array of co-operative projects including the promotion of mechanized agriculture. In 1981, the

¹⁴ Jae Yoon Im 임재윤, Hyungsub Choi 최형섭, “Choe Hyeongseop-gwa ‘Hanguk hyeong baljeon model’-ui giwon 최형섭과 ‘한국형 발전 모델’의 기원 (Choi Hyung Sup and the Origins of the ‘Korean Development Model’),” *Yeoksa bipyeong* 역사비평 118 (2017), 178-179.

¹⁵ Tae-Ho Kim, “Making Miracle Rice: Tongil and Mobilization a Domestic “Green Revolution” in South Korea,” in Hiromi Mizuno, Aaron S. Moore, and John DiMoia eds., *Engineering Asia* (cit. n. 4), 189-208.

Government of the Republic of Korea and the Government of the Republic of the Philippines signed the Basic Agreement on Scientific and Technological Co-operation and henceforth have steadily pursued various programs, including the invitation and education of trainees, dispatch of experts, and implementation of joint research projects.

Science and Technology under Authoritarian Regimes

One overarching goal of examining science and technology in South Korea, Vietnam, Indonesia, and Philippines together is to understand the development of science and technology under authoritarian political systems or the synergy between authoritarian regimes and science and technology/scientists and engineers.

Because science and technology is generally regarded as public goods and as having practical utility, states have come to play the role as dominant patrons boosting the development of science and technology, a trend that has become especially pronounced following the two World Wars. Of course, in order to secure such patronage from the state, scientists and engineers had to convince their respective governments that their work was useful and that states needed their services. This was often a double-edged sword for the scientists as government support tended to compromise their autonomy. At times, the governments tried to control scientific activities or lead them in a certain direction, while scientists and engineers made efforts to secure their professional autonomy.¹⁶

Under repressive political systems, scientists and engineers were more likely to be affected, directly or indirectly, by the intentions of the regimes in power. Guided by their own interests, such regimes could impose various demands on scientists and engineers, and if scientists and engineers complied with those unjust demands, undesirable distortions in scientific and technological activities inevitably followed. In extreme cases, they might lead to serious distortions such as “Aryan physics” in Nazi Germany or the “Lysenko affair” in the Stalinist Soviet Union. The cases of the “revolutionary utilitarianism” proposed in China during the Cultural Revolution and the conflict between the authoritarian regime and scientists and engineers in Brazil during 1964-80 also exemplify the difficulties imposed on scientific and technological development under authoritarian political systems.¹⁷

¹⁶ John Krige, *American Hegemony and the Postwar Reconstruction of Science in Europe* (Cambridge, Mass.: MIT Press, 2006), 15.

¹⁷ Paul R. Josephson, *Totalitarian Science and Ideology* (New York: Prometheus Books, 2005); Peter Neushul and Zuoyue Wang, “Between the Devil and the Deep Sea: C. K. Tseng, Mariculture, and the Politics of Science in Modern China,” *Isis* 91:1 (2000), 59-88; Antonio Jose J. Botelho, “Struggling to Survive: The Brazilian Society for the Progress of Science (SBPC) and the Authoritarian Regime (1964-1980),” *Historia Scientiarum* 38 (1989), 45-63.

There are numerous cases in which authoritarian regimes exerted strong ideological influence on science and technology. Mark Walker demonstrates that, rather than offering resistance, scientists and engineers usually complied with the demands of the regimes so as to be able to continue their activities, and they justified their compliance in the name of neutrality and purity of science and technology.¹⁸ Nevertheless, the consequence of state directives was not always stagnation or distortion of science and technology. For instance, in her survey of the history of science and technology policy in Taiwan beginning from the relocation of the Kuomintang (KMT; Chinese Nationalist) government in Nanjing to the island in 1927 through 1982, J. Megan Greene shows that while the KMT government indeed silenced critical voices through martial law, it never repressed, in an authoritarian manner, the technocrats and the scientific community who presented critical opinions to improve the Taiwanese system.¹⁹ In particular, Greene also shows that the KMT's interest in the development of science and technology increased considerably after China's development of nuclear weapons in the mid-1960s and that the Science and Technology Advisory Group (STAG), consisting of personnel from the academia, industries, and government, was instrumental in advancing technological development policy including the construction of the Hsinchu Science Park. Lino Camprubí documents an example from Spain where scientists and engineers in the early stage of Francisco Franco's rule (1938-1973) not only complied with the intentions of the regime but also actively used it to realize their own ideas, leading to the growth of their respective fields, research institutes, and new projects.²⁰ Using the concept of a "technological state," Sulfikar Amir addresses the co-constitution of authoritarian regimes and state-of-the-art technology under the Suharto regime (1968-98) in Indonesia.²¹ Centering on Habibie, who had Suharto's backing, engineers and technocrats pursued the grand idea of transforming Indonesia through technology, before being frustrated by internal problems and the Asian financial crisis of 1997. Recently, some researchers have argued that Chinese science and technology has also continued to develop throughout the Cultural Revolution, though it is still under debate whether this development was accomplished "despite or due to the Cultural Revolution."²²

How was compressed growth of science and technology achieved? What effect did an authoritarian regime have on that process, and what role did scientists and engineers play? These questions are applicable in the case of South Korea, which also endured an authoritarian government that pursued rapid development of science

¹⁸ Mark Walker, *Science and Ideology: A Comparative History* (London: Routledge, 2003).

¹⁹ J. Megan Greene, *The Origins of the Developmental State in Taiwan: Science Policy and the Quest for Modernization* (Cambridge, Mass.: Harvard University Press, 2008).

²⁰ Lino Camprubí, *Engineers and the Making of the Francoist Regime* (Cambridge, Mass.: MIT Press, 2014).

²¹ Sulfikar Amir, *The Technological State Indonesia* (cit. n. 6).

²² Danian Hu, "Despite or Due to the Cultural Revolution: The Development of Chinese Science, Technology, and Medicine in the 1960s and 1970s," *Endeavour* 41:3 (2017), 78-84.

and technology in nearly the same period as Taiwan. The 1960s and 1970s, a period during which the Park Chung Hee regime aspired to the “modernization of the homeland,” witnessed cataclysmic changes in the politics, economy, and society of South Korea. In pursuing swift industrialization and economic growth, the regime mobilized science and technology, and Korean scientists and engineers in turn saw this as an opportunity to improve the nation’s poor scientific and technological environment.²³ The scientific and technological infrastructures built during the time began to yield the fruits of research in earnest in the 1980s, through the implementation of large-scale national R&D projects.

Although the three papers in this special issue do not address this topic head on, they nevertheless can serve as useful starting points. Habibie, who led science and technology policy in Indonesia for 20 years, is respected even today as a figure who built science and technology in Indonesia. In contrast, it is difficult to say that Vietnam and the Philippines have so far made visible accomplishments in science and technology. Against disparate backgrounds, all of these countries also differ in the relationships forged between science and technology and the ruling political regimes. Nevertheless, the growth of science and technology or the roles of scientists and engineers under authoritarian political systems including those in South Korea will continue to be explored in the future.²⁴

²³ Kang Mi Hwa 강미화, “Hanguk gwahakja sahoe-wa jeongbu-ui gwangye byeonhwa: 1960-70nyeondae hanguk gwahak gisul danche chong yeonhaphoe-reul jungsim-euro” 한국 과학자사회와 정부의 관계 변화: 1960-70년대 한국 과학기술단체총연합회를 중심으로 (Changes in the Relationship between the Scientific Community and the Government: Focusing on the Korean Federation of Science and Technology Societies) (Ph.D. dissertation, Chonbuk National University, 2015).

²⁴ For the current discussion on the relationships between science, technology, and mass dictatorships, see Sang-Hyun Kim, “Science and Technology: National Identity, Self-reliance, Technocracy and Biopolitics,” in Paul Corner and Jie-Hyun Lim eds., *The Palgrave Handbook of Mass Dictatorship* (London: Palgrave Macmillan, 2016), 81-97.