

Promoting Science for the Modern Archipelago: Science in the Twentieth-Century Philippines

JEONG Se-Kwon [†]

Introduction

Writing about the history of science in the Philippines up to the mid-twentieth century, Warwick Anderson observed that “it should be evident by now that science has had many different meanings in the Philippines.” Unlike the previous view, which regarded the history of science in the Philippines as a process of linear transformation from the stage governed by religious strategies of the Spanish colonial state to the civic one of the American rule, we now know that different actors and cultural forces influenced and were entangled with science in the Philippines for the past several hundred years. To the Christian priests, such as the Jesuits and other Spanish clergy, scientific investigation was a tool for personal salvation and for secular needs to understand and exploit exotic nature. To the Americans, who came to the Philippines with new experimental science, the archipelago and its people were wild and primitive and thus were to be civilized, while Filipinos with Western educations advocated science and technology to achieve national independence and development. Although each of these periods had its own dominant features, no clear-cut divisions separate them, because some scientific efforts of the earlier period very often remained and overlapped with those of the later period. Therefore, we should scrutinize “the local significance of ‘doing science’ or ‘becoming science’” in each period as Anderson argued, and we should try to understand the central feature to penetrate the long history of science in the Philippines.¹

This article reviews the history of science in the twentieth-century Philippines, with a particular aim to show a prominent trend that characterized “doing science” in the Philippines. Although various actors and cultural forces were involved, scientific and technological projects after the American rule were promoted and supported in the name of “modernizing the Philippines,” which had various implications for those actors. To imperial scientists and public servants, the modern Philippines made

Received July 28, 2018; Reviewed August 25, 2018; Accepted August 30, 2018.

[†] Sookmyung Women’s University, gaucher@hanmail.net

¹ Warwick Anderson, “Science in the Philippines,” *Philippine Studies* 55:3 (2007), 287-316. Quoted from 311.

by means of science and technology meant a way to hygienic modernity and economic profit, not for native people; to many *ilustrados* (the Filipino educated class), it meant a way to national improvement and independence; and to Ferdinand Marcos, it meant a way to economic and social development. This article will demonstrate that science and technology in the Philippine Islands after 1900 were planned and pushed ahead primarily by the governmental agencies and that, during the Marcos presidency, the active science and technology policies by the government converged on the final aim of “national development.”

Modern Philippines for Imperial Project or Independence: Science in the Pre-Marcos Presidency

After the war against the Spain in 1898, the U.S., then a new imperial power, initiated scientific projects to build the Philippine Islands as a valuable and secure colony. To this end, the U.S. established a variety of organizations, the aims of which were to investigate nature and the native people and to protect American troops and officials in the archipelago. First, while marching from Manila to its suburb, medical researchers of the U.S. Army had to conduct research into exotic tropics and various diseases and to put sanitary orders into practice. In 1898-1899, the U.S. Army organized “Pathological Laboratories” and “Army for the Investigation of Tropical Diseases in the Philippine Islands.” Simon Flexner and Lewellys Barker, professors at the Johns Hopkins Medical School, visited the Philippines to investigate tropical diseases, such as dysentery, typhoid fever, and malaria fever, and to look into U.S. military hospitals and civil medical facilities.² Whether military or not, their research on tropical diseases and hygienic orders served the U.S. imperial strategies by isolating Filipino guerillas, such as Aguinaldo’s rebel troops, by imposing a sanitary quarantine and helping Americans settle down in tropical climates.³

After suppressing Aguinaldo’s troops and constructing a civil colonial government in 1902, the U.S. began aggressively exploiting the tropical flora and fauna and minerals and systematically investigating tropical and endemic diseases with up-to-date experimental facilities. The U.S. also scrutinized various natives, including non-Christian tribes. In 1902, President Theodore Roosevelt asked the National Academy

² Simon Flexner and Lewellys F. Barker, “The Prevalent Diseases in the Philippines,” *Science*, new series, vol. 11, no. 275 (April 6, 1900), 521-528.

³ Warwick Anderson, *Colonial Pathologies: American Tropical Medicine, Race, and Hygiene in the Philippines* (Durham, London: Duke University Press, 2006), esp. chap. 2, “The Military Basis of Colonial Public Health,” 45-73; Mary C. Gillet, “Medical Care and Evacuation during the Philippine Insurrection, 1899-1901,” *Journal of the History of Medicine and Allied Science* 42 (1987), 169-185; Reynaldo C. Ileto, “Cholera and the Origins of the American Sanitary Order in the Philippines,” in David Arnold ed., *Imperial Medicine and Indigenous Societies* (Manchester, New York: Manchester University Press, 1988), 125-148.

of Science to create a committee to contemplate the needs of scientific investigation in the Philippines, saying that this should be “the national work.” This committee presented a report in 1903, which noted that the U.S. colonial rule of the Philippines was the first attempt to complete the civilization of Anglo-Saxon in the tropics. The report then emphasized an urgent need for comprehensive scientific research, especially coastline and geographical surveys and geological, zoological, and botanical studies. According to the report, pure scientific expeditions into untrodden and inexhaustible nature would give economic benefits to the U.S. as shown in historical experiences.⁴

The aspiration of President Roosevelt and the committee to build the archipelago as a useful and safe colony, which might seem to be a “modern colony” hygienically and economically, was realized by the Bureau of Science. Organized as the Bureau of Government Laboratories in 1901 and renamed in 1905, the Bureau of Science was, both in name and reality, the largest and the most powerful scientific agency in the colonial Philippines. In 1903, it incorporated the blood serum laboratory from the Board of Health and the Department of Botanical Survey from the Bureau of Agriculture. In 1905, it absorbed the Bureau of Mines. In 1906, it incorporated the Bureau of Non-Christian Tribes from the Bureau of Education. Having begun as a biological lab, the Bureau of Science became a large and comprehensive scientific agency that dealt with such diverse fields as public health, agriculture, and industry. It consisted of three units, biological, chemical, blood serum laboratories, and it had 60 research rooms.⁵ The aims of the Bureau of Science were to investigate natural resources and tropical diseases in the archipelago to help the U.S. govern and exploit the Philippine Islands effectively.

The Philippine Islands has a greater need of scientific work for its sanitary, economic, and industrial development than those countries that have been carrying on such work for a longer period. There are still many tropical diseases concerning which far too little is known and for which we have yet no remedy. There are many industries carried on in a primitive fashion in the Philippine Islands that could be vastly developed. Sources of wealth are being discovered that previously have remained untouched. There is reason to believe that the resources of the Islands can be developed along many lines.⁶

With the latest experimental instruments and facilities,⁷ the Bureau of Science

⁴ Theodore Roosevelt and William H. Brewer et al., “Scientific Surveys of the Philippine Islands,” *Science*, new series vol. 21, no. 542 (May 19, 1905), 761-770.

⁵ Alvin J. Cox, “The Philippine Bureau of Science,” *Bureau of Science Series Press Bulletin* no. 87 (1918), 2-3.

⁶ *Ibid.*, 2.

⁷ Richard Pearson Strong, “The Bureau of Government Laboratories for the Philippine Islands: Scientific Position under It tec.,” *American Medicine* 5:17 (April 25, 1903), 665-667.

surveyed and classified systemically natural resources in the Philippines, such as minerals, soils, metals, flora and fauna, which might be beneficial to the industry of the Philippines (and finally to that of the U.S.). It also conducted zoological and botanical investigations looking for edible and medically useful species. At the outbreak of epidemics, the Bureau carried out bacteriological investigations into bloods, saliva and excreta. The results of these investigations for effective exploitation were reported and spread in several prints. As far as its works and roles were concerned, the Bureau of Science could be compared to the Imperial Institute in South Kensington of London, which was a symbolic institution for the British Empire.⁸

Another important role undertaken by the Bureau of Science was the publication of a scientific journal, the *Philippine Journal of Science*. At first, the Bureau published 36 bulletins irregularly with data derived from the scientific survey. However, in 1906, the Bureau adopted the form of a journal to cover enormous data and to reduce the cost of publication.⁹ When first published, the *Philippine Journal of Science* covered all scientific fields in a single volume. The next year, however, it was divided into several different volumes, such as “General Science,” “Medical Science,” and “Botany.” The titles of “General Science” and “Medical Science” were later changed to “Chemical and Geological Science and the Industries” (1910) and “Medical Medicine” (1912), while a new section entitled “General Biology, Ethnology, and Anthropology” was added.¹⁰ This shows that scientific surveys in the colonial Philippines developed and diversified very rapidly.¹¹

In addition to the Bureau of Science, other institutions for scientific research and education were established during the period of American rule, such as the Manila Medical Society (1901, merged into the Philippines Islands Medical Society in 1903), the University of the Philippines and the Philippine General Hospital (1908). The University was founded by the American colonial government through Act No. 1870 to provide “advanced instruction in literature, philosophy, the sciences and arts, and to give professional and technical training.” The University consisted of the School of Fine Arts, the College of Liberal Arts, the College of Medicine, the College of Veterinary Medicine, and the College of Engineering.¹² The Philippine General Hospital was established in 1907, as the Philippine Commission had passed a law to

⁸ Cox, “Philippine Bureau of Science,” 5-9; “The Imperial Institute,” *Journal of the Royal Statistical Society* 50:1 (March 1887), 167-169.

⁹ “Report of the Secretary of the Interior,” *Seventh Annual Report of the Philippine Commission, 1906, part 2* (Washington: Government Printing Office, 1907), 28.

¹⁰ *Bureau of Science, Content and Index: Philippine Journal of Science*, vol. 1 (1906) to vol. 10 (1915) (Manila: Bureau of Science, 1917), 7-67.

¹¹ “Report of the Secretary of the Interior,” 28.

¹² “University History,” <https://www.up.edu.ph/index.php/about-up/university-history> (accessed on April 24, 2018); Act No. 1870. <https://www.gov.ph/1908/06/18/act-no-1870> (accessed on April 28, 2018).

build it, and it became the largest state-owned hospital administrated by the University of Philippines. It aimed to deal with many patients and to train medical students of the University of the Philippines.¹³ Although they were smaller in scale than the Bureau of Science, these institutions later played important roles in scientific research and education in the Philippines.

While in the earlier times of the American rule, scientific investigations and hygienic measures were carried out only by the American scientists, many *ilustrados* soon became a part of the colonial rule and finally substituted for the Americans after the achievement of Commonwealth Status in 1935. From the beginning of the American rule, Filipinos could participate in the colonial bureaucracy as lower ranking officials, and their number and status elevated dramatically. In 1921, Filipinos occupied approximately 90 percent of the public servants and in 1930s more than 99 percent.¹⁴ American scientists in the Archipelago worried that they might lose their jobs and be driven out to their mother country. For example, when there was controversy over the issue of consolidation of the Bureau of Science with the Philippine General Hospital in 1914 and some Filipinos tried to get more positions, Victor Heiser, the director of the Board of Health in Manila, expressed his concern about the conflicts with Filipinos, noting that it might be impossible for American public health experts to conduct their work in the Philippines.¹⁵ The empty positions left by the leaving American scientists were filled by Filipinos educated in the Philippines and the United States, such as Leopoldo B. Uichanco (1894-1972), who took the position of professor of agriculture in the University of the Philippines in 1923, Angel S. Arguelles (1888-1952), who became director of the Bureau of Science in 1926, and Victor Buencamino (1888-1977), who became the Undersecretary of Agriculture and Commerce in the 1930s.¹⁶ Although many Filipinos took the scientific and public posts, the work and role of the scientific institutions did not change. The Bureau of Science continued to examine specimens related to tropical, endemic diseases, to produce vaccines, to analyze minerals and metals, and so on.

Whether carried out by American scientists or by Filipinos, scientific projects in the early twentieth-century Philippine Islands were involved with the project of modernizing the Philippines, even though the meaning of “modern” was not uniformly shared by those actors. Most of all, American rulers believed that scientific research

¹³ “History,” Philippine General Hospital (September 5, 2013). <http://www.pgh.gov.ph/en/about-us/history> (accessed on March 5, 2018).

¹⁴ T. Agoncillo, *A Short History of the Philippines* (New York: New American Library, 1969).

¹⁵ Victor Heiser to Richard P. Strong (9 January 1914), GA 82, Box 16, Folder 13, Francis-Countway Library, Harvard Medical School. Strong, the former director of the Biological Laboratory in the Bureau of Science and in 1914 a professor of Tropical Medicine at the Harvard Medical School, had advised Heiser to come back and work in the Rockefeller International Health Commission. Strong to Heiser (10 February 1914), GA 82, Box 16, Folder 13, Francis-Countway Library, Harvard Medical School.

¹⁶ Anderson, “Science in the Philippines” (cit. n. 1), 305-306.

in the Philippines would bring economic benefits to the U.S.¹⁷ As Cox, the director of the Bureau of Science, had found “sources of wealth” in the archipelago, in 1900, Governor-general W. Cameron Forbes emphasized an urgent need to understand this unknown island, stressing the importance of scientific knowledge and expertise on fish, trees, and birds.¹⁸ To them, the nature of the archipelago had to be changed from disorganized and chaotic into thoroughly investigated and systemically classified resources to be serviceable to the U.S. American rulers also stressed the need to become hygienically modern, that is, safe for the American inhabitants, and emphasized medical education to convert Filipinos from “micorbial insurrectos” to “civil potential.” This education was called “medical mobilization.” By regulating the unsanitary, pathological habits of Filipinos, such as discharging excreta carelessly, and by disciplining civic virtues, such as self-confidence, diligence, self-control, and hygiene, the Americans wished to change Filipinos and the archipelago to be harmless to the Americans and to construct the Philippines as a giant laboratory in which the power of the U.S. civilization could be proved.¹⁹ To the American rulers, scientific and medical projects were considered tools for modernizing the archipelago, which would then be economically useful and hygienically safe to the U.S.

Like the American rulers, many *ilustrados* emphasized the significance of science in the pre-modern Philippines for its future and independence, though they thought that total independence would happen only in the distant future. They viewed science as a way to get ready for modernized and independent Philippines in the future, saying that “the future is bright, because our people are becoming scientific-research-minded” (E. B. Rodriguez) and that “a nation dedicated to science, that applies it in various complex national activities, can look forward with confidence to its future and is bound to survive through the vicissitudes of time” (A. S. Arguelles).²⁰

Therefore, even tragic accidents taking place during scientific investigations could be ignored in the name of scientific progress. In November 16, 1906, Richard P. Strong, the director of the biological laboratory at the Bureau of Science, inoculated cholera vaccines to prisoners in Bilibid Prison, Manila, thirteen of whom died in a few days due to the contamination of the vaccines with plague bacillus. This news was presented to Government-General James F. Smith and was also spread to the U.S. by newspapers. The Government-General established a commission to investigate this accident. Although the commission accused Strong of “criminal negligence,” he was never punished legally and was even promoted to the professor of Tropical Medicine at the University of the Philippines and the director of the Tropical Department of the Manila General Hospital in 1907. None of the Filipinos or Americans

¹⁷ Roosevelt and Brewer et al., “Scientific Surveys of the Philippine Islands” (cit. n. 4), 762.

¹⁸ Anderson, “Science in the Philippines,” 299.

¹⁹ Anderson, *Colonial Pathologies* (cit. n. 3), 4.

²⁰ Anderson, “Science in the Philippines,” 305.

questioned the responsibility.²¹

Motivated by American scientists and appropriated more and more by the *ilustrados*, science in the Philippines became increasingly organized and systematized after the establishment of the Commonwealth in 1935. In 1933, Manuel L. Quezon, the President of the Philippine Senate, who was soon to be the second President of the Commonwealth of the Philippines (1935-1944), established a National Research Council resembling that of the U.S., which would support the organization of science and improve special research projects.²² In 1946, the Bureau of Science was replaced by the Institute of Science under the executive supervision of the President of the Philippines (by Representative Act No. 51). This Institute was renamed the Institute of Science and Technology in 1950 (by Representative Act No. 422) and finally changed into the National Scientific and Industrial Research Institute (by Representative Act No. 1606) in 1956. In addition, the Philippines Association for the Advancement of Science was organized in 1951. Finally, the National Science Development Board was established in 1958 by the “Science Act of 1958” “to integrate, coordinate, and intensify scientific and technological research and development and to foster invention.”²³

In sum, scientific projects during the period of American rule and after the creation of the Commonwealth of the Philippines were related to modernizing the archipelago, although it had different implications to the American rulers and the Filipinos. The Americans had to convert the Philippines into a serviceable colony economically by scrutinizing and classifying natural resources which remained disorganized and hygienically by implementing sanitary orders and disciplining Filipinos medically. To the Americans, modern science would be the most effective tools to achieve their imperial project in the Philippines. The educated Filipinos who participated in the colonial bureaucracy viewed scientific knowledge and research as sound preparation for the future and their entire independence. They brought about the success of the scientific organizations established by the Americans and developed their own institutions for self-governing after 1935. Whether as part of an imperial enterprise or to further the desire for self-governance, scientific projects in the early twentieth

²¹ Paul Freer, “Accidental Inoculation with the Virus of Plague,” *Journal of the American Medical Association* 48:15 (April 13, 1907), 1265-1265; Eli Chernin, “Richard Pearson Strong and the Iatrogenic Plague Disaster in Bilibid Prison, Manila, 1906,” *Review of Infectious Diseases* 11:6 (1989), 996-1104; Kristine A. Campbell, “Knots in the Fabric: Richard Pearson Strong and the Bilibid Prison Vaccine Trials, 1905-1906,” *Bulletin of the History of Medicine* 68:4 (1994), 600-638; Se-Kwon Jeong, “Richard P. Strong and American Tropical Medicine in the Colonial Philippines” (in Korean), *The Korean Journal for the History of Science Society* 36:3 (2015), 241-268.

²² <http://www.nrcp.dost.gov.ph/transparency/vision-missions-mandates> (accessed on March 6, 2018).

²³ Anderson, “Science in the Philippines,” 308-309; “The Science Act of 1958” <http://www.dost.gov.ph/phocadownload/Downloads/Resources/RA/REPUBLIC%20ACT%20No.%202067%20Science%20Act%20of%201958.pdf> (accessed on May 15, 2018).

century were honored and encouraged to modernize Filipinos and the nature of the Philippines.

Modern Nation Building with an Economic Emphasis: Science in the Marcos Presidency (1965-1986)

When elected as the President of the Philippines in 1965, Ferdinand E. Marcos (1917-1989) propelled several policies to support science and technology for modern nation building. Marcos' State of the Nation Addresses demonstrated how much he emphasized the importance of science and technology for national development. In his second State of the Nation Address in January, 1967, Marcos noted that "what is being written" in the Philippines "is the epic of development," and that "science teaching is necessary for our development programs." Marcos then directed that the Department of Education to revitalize the science courses in public high schools by implementing a program for science teaching over a four-year period using the latest equipment.²⁴ In his third State of the Nation Address in 1968, Marcos emphasized that additional funds were needed to support new projects in the field of applied science. He said that "technology is the foremost factor in economic development today."²⁵ In 1969, pointing out the backwardness of the Philippines in science and technology, Marcos proposed to activate a kind of science research complex, called the "Philippine Science Community," at Bicutan, Taguig and Rizal, which would accommodate research laboratories, pilot plants, technical workshops, a science museum, and other research facilities. Moreover, Marcos emphasized the manpower training program that had been governed by the National Science Development Board (NSDB) to train graduates and undergraduates to become science scholars and to support "urgently needed research" in private institutions including colleges and universities.²⁶

Marcos' comments on the relationship between science and economic development in his fifth State of the Nation Address in 1970 were particularly remarkable. While repeating his address of the previous year, particularly the "new Filipinism" to set the nation on a firm and unchangeable course toward progress and independence, Marcos stressed that the NSDB had to deal with an industrial agenda with a few related agencies, such as the Philippine Coconut Research Institute, the Philip-

²⁴ F. Marcos, "A Epic of Nation-Building," (January 1967), <http://sona.inquirer.net/181/state-of-the-nation-address-1967-ferdinand-marcos> (accessed on May 3, 2018).

²⁵ F. Marcos, "A Nation of Archivists," (January 1968), <http://sona.inquirer.net/179/state-of-the-nation-address-1968-ferdinand-marcos> (accessed on May 5, 2018).

²⁶ F. Marcos, "New Filipinism: The Turning Point," (January 1969), https://en.wikisource.org/wiki/Ferdinand_Marcos%27_Fourth_State_of_the_Nation_Address (accessed on May 9, 2018).

pine Textile Research Institute, and the Philippine Inventors Commission. By solving new problems in the coconut and textile industries and by encouraging inventors to develop machines useful for economic development, these agencies and the NSDB, according to Marcos, would contribute to “developing the country’s resources and applying these resources to the acceleration of the economic, social, and cultural progress of the country.”²⁷ After Marcos’ declaration of martial law in 1972, science and technology became two of the most important keywords for the Philippines’ nation-building project. For example, Article XV, Section 9(1) of the amended 1973 Philippine Constitution provides: “The State shall promote scientific research and invention. The advancement of science and technology shall have priority in the national development.”²⁸

The scientific and technological projects announced in Marcos’ State of the Nation Addresses and the Constitution of 1973 were realized by several Executive Orders during his presidency. Executive Order No. 68, one of the first orders mentioning the necessity of science and technology, suggested that a scientific advisory body for commerce and industry be established. To solve many difficulties arising from inadequate and disorderly standardizations, Marcos created the Philippine Standard Council, which consisted of representatives from the Department of Commerce and Industry, the Bureau of Standards, the NSDB, and the Department of Education.²⁹ The Marcos’ government also promulgated policies that specifically targeted individual industries. For instance, Executive Order No. 71 specified that all government-owned vessels, together with some privately-owned vessels, be mobilized to train cadets of the Philippine Merchant Marine Academy to become scientific experts on marine transportation.³⁰ Marcos and his government also created the National Artificial Rain Stimulation Committee for food industry and agriculture,³¹ the National Committee for Mineral Explorations and Survey Operation to search for hydrocarbons and solid minerals,³² and a board to research the scientific systems for classifying and grading flue-cured tobacco and the methods for properly handling and packaging it for the domestic and foreign markets.³³ Similar orders were issued until Marcos resigned in 1986 for the food industry and agriculture (Executive Order

²⁷ F. Marcos, “National Discipline: The Key to Our Future,” (January 1970), https://en.wikipedia.org/wiki/Ferdinand_Marcos%27_Fifth_State_of_the_Nation_Address (accessed on May 13, 2018).

²⁸ “Constitution of the Philippines (1973),” [https://en.wikisource.org/wiki/Constitution_of_the_Philippines_\(1973\)#Article_XV:_General_Provisions](https://en.wikisource.org/wiki/Constitution_of_the_Philippines_(1973)#Article_XV:_General_Provisions) (accessed on June 1, 2018).

²⁹ “Executive Order No. 68,” (May 28, 1967) in *Message of the President Ferdinand E. Marcos 1965-1986, Book 10, Volume 4, Executive Orders Part 1* (Manila: The Presidential Communications Development and Strategic Planning Office, 2016), 134-135. Hereafter *Message of Marcos*.

³⁰ “Executive Order No. 71,” (May 28, 1967) in *Message of Marcos, Part 1*, 140.

³¹ “Executive Order No. 212,” (February 17, 1970) in *Message of Marcos, Part 1*, 473-474.

³² “Executive Order No. 243,” (July 7, 1970) in *Message of Marcos, Part 2*, 36-37.

³³ “Executive Order No. 331,” (August 10, 1971) in *Message of Marcos, Part 2*, 168-170.

No. 332 in 1971), for the coconut industry (Executive Order No. 417 in 1973), for the metal industry (Executive Order No. 602 in 1980), and for the textile industry (Executive Order No. 700 in 1981).

The government emphasis on science and technology was not limited to their relevance to the national economic development. Science and technology, especially biomedicine and public health, was also advocated to build a hygienically modern and safe nation. Executive Order No. 332 in 1971, which created the Pesticides Control and Research Committee for agriculture, suggested a broader goal behind the measure, which was “to combat pollution in whatever form to safeguard public health and safety.” This agenda to establish the Philippine Islands as a hygienic and safe nation through the promotion of biomedical research was more evident in Executive Order No. 337 issued during the same year. In this, Marcos suggested organizing a Medical Assistance Program Task Force for the “extension of medical care to all residents in an evolutionary way within our economic means and capability as a nation” and for “providing the people of the country a practical means of helping themselves pay for adequate medical care.”³⁴ This policy was continuously pursued by successive orders to deal with air pollution and environmental contaminations (Executive Order No. 342 in 1971 and No. 375 in 1972) and was climaxed by the establishment in 1979 of the Health Sciences Center. The Center consisted of the units of the University of the Philippines related to the health sciences. The Executive Order that promulgated the Health Sciences Center announced that “health is an essential component of the New Society’s program for the upliftment of the Filipino.”³⁵ Subsequently, as the control of tropical and communicable diseases, such as schistosomiasis, malaria, filariasis, amoebiasis, and diphtheria, was “one of the government’s priorities for national development in the field of health,” the Research Institute for Tropical Medicine in 1981 was organized “to undertake research activities in the diagnosis, control, and prevention of tropical diseases that are major causes of mortality and morbidity in the Philippines.”³⁶

During Marcos’ presidency, science that was not focused on a specific industry or public health was also emphasized to prepare the future of nation as a whole. Therefore, the government issued orders to recommend establishing organizations as part of a developmental strategy, such as the National Computer Center, which was proposed in 1971 to “provide the information bases for integrated planning and implementation of development programs and operational activities at the national level,”³⁷ and the Task Force on the Formulation of a National Action Program on Science and Technology in 1978 for “identification and establishment of a network of research institutes necessary to support the needs of industry and of government

³⁴ “Executive Order No. 337,” (September 1, 1917) in *Message of Marcos, Part 2*, 180-182.

³⁵ “Executive Order No. 519,” (January 24, 1979) in *Message of Marcos, Part 3*, 110-111.

³⁶ “Executive Order No. 674,” (March 25, 1981), in *Message of Marcos, Part 3*, 478-490.

³⁷ “Executive Order No. 322,” (June 12, 1971), in *Message of Marcos, Part 2*, 153-155.

according to prioritized key sectors to include determination of manpower, resource and organizational requirements.”³⁸ The government encouraged these organizations to contribute to the whole range of the national development project, not specifically limited to economic development, as shown by the following statements in the Executive Order: “there is an urgent need for more rational allocation and faster development of the country’s resources to meet the growing demands of the people,” and “it is recognized that science and technology is a critical resource in the promotion of national development and improvement of people’s well-being.”³⁹

While so many State of the Nation Addresses and Executive Orders directed policies on science and technology during the Marcos presidency, all of these policies were managed and supervised by a central organization, the NSDB, the successor of which remains the key agency today. In 1958, the NSDB was established by the “Science Act of 1958” after the National Science Board (1956) as an administrative branch of the government to supervise several organizations related to science and technology. The NSDB assumed all responsibilities for all scientific activities until 1982. Personnel of the NSDB participated in every unit of the government that dealt with science and technology as chairman, vice-chairman, or members. In 1982, the NSDB was reorganized into the National Science and Technology Authority (NSTA) by Executive Order No. 784. For “an innovative comprehensive national planning approach for science and technology that would effectively integrate the totality of government scientific and technological efforts and harmonize such efforts with those of the private sector to achieve greater national gross,” the NSTA had more power than the NSDB in formulating a Comprehensive National Plan for Science and Technology. It also supervised several agencies, such as the National Institute of Science and Technology, the Food and Nutrition Research Institute, the Philippine Institute of Volcanology, the Forest Products Research and Development Institute, the Philippine Invention Development Institute, the Science Foundation of the Philippines, and the Materials Science Research Institute. Furthermore, the NSTA exercised administrative supervision over the National Academy of Science and Technology, the Philippine Atomic Energy Commission and the Science and Technology Councils.⁴⁰ Figure 1 is stamp issued to celebrate the 25th anniversary of the NSTA, in which “1958-1983” refers to the period of the NSTA’s existence, which was counted from the establishment of the NSDB in 1958. The four sections show the main fields of science and technology that the NSTA supervises, agriculture, fishery, forestry and mine industry (green), biomedicine (orange), energy (red) and chemistry etc. (violet). As shown in Figure 1, the NSTA was the central organization that

³⁸ “Executive Order No. 512,” (October 28, 1978), in *Message of Marcos, Part 3*, 86-88.

³⁹ “Executive Order No. 322,” in *Message of Marcos, Part 2*, 53; “Executive Order No. 512,” in *Message of Marcos, Part 3*, 86.

⁴⁰ “Executive Order No. 784,” (March 17, 1982) in *Message of Marcos, Part 4*, 230-237.

managed almost all of the fields of science and technology in the Philippines.

Marcos and his government also sought to display science and technology to the general public as the way to national development, and Marcos' Proclamations were the major means to publicize this agenda. Unlike executive orders, which prescribed

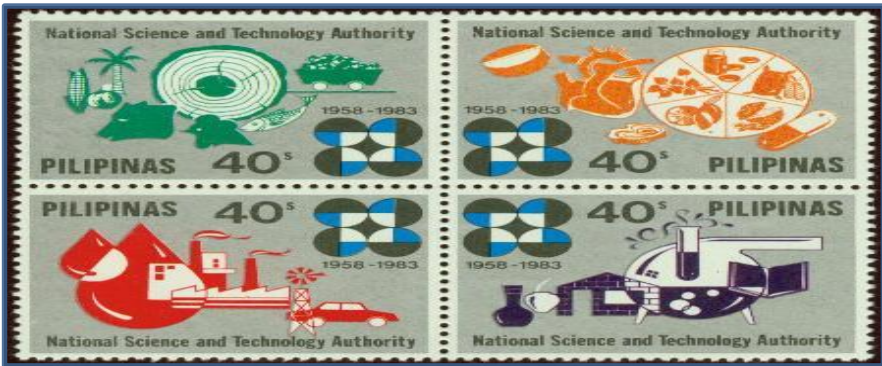


Figure 1. Stamp for celebrating the 25th anniversary of the NSTA (July 8, 1983).

Source: <http://www.philippinestamps.net/RP1983.htm#RP1983> (accessed on July 3, 2018)

forms and functions of governmental organizations, proclamations were issued to announce governmental campaigns to promote science and technology. From its earliest times, the Marcos government held “Science and Technology Week” to enlighten the public about science and technology throughout the country. The NSDB took charge of the national observance of the Week, and other related agencies, including the Philippine Academy of Science and Humanities and the Philippine Association for the Advancement of Science, also participated in this national movement.⁴¹ Government agencies and related institutions also held campaigns to introduce and advertise the value of science and technology as the crucial means for national development. During the Marcos presidency, these campaigns, referred to as the “Week,” not only dealt with science and technology in general, but also focused on specific fields, such as electronics, chemistry, and atomic energy. These Weeks were held almost every month and every year, and even several “Weeks” were observed at the same time (see Appendix).

Science and technology in these “Weeks” were described in the same way as they were in Executive Orders. For example, during the Electronics and Telecommunications Week in July 20-28, 1968, electronics and telecommunication were described as the key technology “to arouse production consciousness and stimulate

⁴¹ “Proclamation No. 197,” (May 1, 1967) in *Message of Marcos, Part 6*, 236.

interest in chemical and allied industries among our people.”⁴² According to Proclamations 988 and 1088, pest control science and technology served “the benefit of our national economy,” and medical technology played important roles “in the promotion of the people’s health.”⁴³ Other proclamations emphasized chemistry as a field central to “the understanding and control, and the many processes of human life”; the science of mathematics as indispensable to “the practice and study of development-oriented areas like economics, demography, finance, management, and the natural and social science”; and electrical technology as “a vital factor in the economic development of a nation.”⁴⁴

During his presidency, Marcos carried out various policies for science and technology and established and reformed government organizations, private institutions, and education. These measures were involved with a variety of different issues of the time concerning science and technology, and they appeared to be disjointed and incoherent. However, science and technology policies during Marcos’ period were planned and practiced consistently under a common slogan, “national development,” which means an economically modern Philippines. This slogan could be traced back to the American rule, even though the meaning of “modern Philippines” differed during the two periods.

Conclusion

Since the end of American rule, science and technology in the Philippines has developed as a means for modernizing the archipelago, whether it meant the American imperial projects for economic exploitation and hygienic safeguard or the Philippine elites’ desire for self-governing and national economic development. Even though various actors were involved in science and technology activities during each phase, they propagated a similar slogan, organized various government agencies, and supervised several affairs.

To review the history of science and technology before the Marcos presidency would contribute to understanding the historical characteristics of science and technology in the Philippines today. For example, the NSTA, which succeeded the NSDB (1958), was again reorganized into the Department of Science and Technology (DOST) in 1987. The DOST as an institutional heir of the NSTA shared its goal,

⁴² “Proclamation No. 382,” in *Message of the President Ferdinand E. Marcos 1965-1986, Book 10, Volume 6* (Manila: The Presidential Communications Development and Strategic Planning Office, 2016), 521.

⁴³ “Proclamation No. 988,” and “Proclamation No. 1088,” in *Message of the President Ferdinand E. Marcos*, 1267, 1287.

⁴⁴ “Proclamation No. 1244,” “Proclamation No. 1419,” and “Proclamation No. 1885,” in *Message of the President Ferdinand E. Marcos*, 1567, 1773, 2342.

because it aimed to “provide central direction, leadership and coordination of scientific and technological efforts and ensure that the result there geared and utilized in the area of maximum economic and social benefits for the people.”⁴⁵ Like the NSDB and the NSTA, the DOST has directed every policy on science and technology in the Philippines and performed campaigns for promoting science and technology to the general public. One of them is the National Science and Technology Week (NSTW), which was renamed in 1993 from the Science and Technology Week, the name adopted during the Marcos era. The NSTW alike announced that “it aims to recognize the contribution of science and technology in the development of the country and garner support from the public and private institutions for its sustainable development.”⁴⁶



Figure 2. Banner of the National Science and Technology Week 2017.

Source: <http://nstw.dost.gov.ph/2017/index.ph> retrieved June 1, 2018.

Reviewing science and technology in the twentieth century Philippines, this paper shows that the government policies were suggested and implemented in the name of “modernizing the Philippines.” However, several questions remain about obtaining a better understanding of science and technology in the Philippines. First, it is necessary to examine the role of non-governmental agencies, such as private enterprises and international aid organizations, since, for example, the Rockefeller International Health Commission and the U.S. Agency for International Development (USAID) played important roles in public health and family planning programs in the Philippines. Second, whether and how science and technology policies in reality influenced the social and economic development in the Philippines should be examined. Finally, studies in a comparative perspective should examine the similarities and differences in science and technology between the Philippines and other Asian countries. By giving some clues to understanding the history of science and technology

⁴⁵ <http://www.dost.gov.ph/transparency/about-dost/history-and-logo.html> (accessed on May 31, 2018).

⁴⁶ <http://nstw.dost.gov.ph/news.php?b=f1> (accessed on June 1, 2018).

in the Philippines, I hope that this article will help to further research on this largely unexplored topic.

[Appendix. Campaigns for Science and Technology During the Marcos Presidency]

Proclamation No.	Date	Title
No. 197	1967. 7. 10. – 7. 16.	Science and Technology Week
No. 379	1968. 7. 15. – 7. 21.	Science and Technology Week
No. 382	1968. 7. 20. – 7. 28.	Electronics and Telecommunications Week
No. 571	1969. 7. 14. – 7. 20.	Science and Technology Week
No. 615	The first week of December of every year since 1969	Electronics and Telecommunications Week
No. 674	1970. 4. 6. – 4. 11.	Chemistry Week
No. 840	1971. 5. 30. – 6. 6.	Chemical Engineering Week
No. 919	1971. 10. 18. – 10. 24.	Mechanical and Electrical Week
No. 930	1971. 11. 22. – 11. 28.	Rural Electrification Week
No. 988	1972. 4. The third week	Pest Control Week
No. 1088	1972. 9. 17. – 9. 24.	Medical Technology Week
No. 1013	1972. 7. 10. – 7. 16.	Science and Technology Week
No. 1015	1972. 5. 21. – 5. 27.	Industrial Medicine Week
No. 1156	1973. 7. 8. – 7. 14.	Chemical Engineering Week
No. 1181	The third week of September of every year since 1973	Medical Technology Week
No. 1206	The last week of November of every year since 1973	Food Science and Technology Week
No. 1211	The second week of December of every year since 1973	Atomic Energy Week
No. 1230	1974. 4. 15. – 4. 21.	Information and Computer Technology Week
No. 1244	1974. 3. 25. – 3. 30.	Chemistry Week
No. 1247	1974. 3. 24. – 3. 30.	Industrial Medicine Week
No. 1251	1974. 7. 15. – 7. 21.	Science and Technology Week
No. 1256	The second week of May of every year since 1975	Crop Protection Week
No. 1311	1974. 10. 21. – 10. 27.	Mechanical and Electrical Engineering Week
No. 1347	1974. 12. The second week	Veterinary Medicine Week

No. 1351	1974. 11. 25. – 11. 29.	Agricultural Science Week
No. 1386	1974. 3. 16. – 3. 22.	Information and Computer Technology Week
No. 1419	1975. 4. 28. – 5. 3.	Mathematics Week
No. 1471	1975. 8. 1. – 8. 7.	National Electrification Week
No. 1562	1976. 7. 26. – 8. 1.	Science and Technology Week
No. 1657	1977. 8. 1. – 8. 7.	National Electrification Week
No. 1751-A	1978. 7. 10. – 7. 16.	Science and Technology Week
No. 1769	1978. 9. 4. – 9. 8.	Information and Computer Technology Week
No. 1872	1979. 7. 8. – 7. 14.	Science and Technology Week
No. 1885	1979. 9. 3. – 9. 10.	Electrical Technology Week
No. 1895	September of every year since 1979	National Science Club Month
No. 1928	1979. 11. 25. – 12. 2.	Electrical Engineering Week
No. 1959	1980. 3. 17. – 3. 21.	Information and Computer Technology Week
No. 2056	1981. 2. 8. – 2. 15.	Chemical Engineering Week
No. 2125	1981. 10. 21. – 10. 24.	Mechanical Engineering Week
No. 2178	1982. 4. 19. – 4. 23.	Information and Computer Technology Week
No. 2214	The second week of July of every year since 1982	National Science and Technology Week

[Source: *Message of the President Ferdinand E. Marcos 1965-1986, Book 10, Volume 5* (Manila: The Presidential Communications Development and Strategic Planning Office, 2016)]

Abstract

Reviewing the history of science and technology from American rule to the Marcos presidency, this paper shows that science was considered the central way to modernize the Philippines. Imperial scientists from the United States encouraged science and technology to achieve a more effective exploitation of the Philippines and to make it a more secure colony for American officials and inhabitants. Therefore, they not only scrutinized and classified thoroughly natural resources with modern scientific ways, but they implemented several sanitary orders and disciplined Filipinos medically. Meanwhile, the educated Filipinos participating in the colonial bureaucracy in part regarded science as the tool for national independence and self-governing. They succeeded and reorganized scientific institutions established by the American rulers and emphasized scientific minds for a future and modern Philippines. During the Marcos presidency, 1965-1986, science was honored and promoted for national economic development. In his proclamations and executive orders, Marcos stressed the importance of science to social and economic development of the Philippines and pushed ahead numerous policies that encouraged science and technology. Although the goal of modernizing the Philippines with science and technology had different meanings to those actors in each phase, it penetrated the history of science and technology in the twentieth-century Philippines.

Keywords: Science and Technology in the Philippines, Ferdinand E. Marcos, Modernizing the Philippines, National Economic Development