

Harbor's Trade: Dezima and Batavia Hub of School and Western Science 1600-1854

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This article is a revision version of papers presented at the National Conference on History X: Maritime Culture and Nation Life Dynamics in Historical Perspectives by Directorate of History of Directorate General of Culture of Ministry of Education and Culture, Jakarta, at Hotel Sahid Jaya, 7 – 10 November 2016. The original title was *Dezima dan Batavia sebagai Pelabuhan Perdagangan dan Pintu Masuk Pengenalan Ilmu Pengetahuan Barat pada Zaman Edo dan VOC (1600-1854)*.

Abstract: *In the 17th century, Dezima was the only port in Japan that allowed VOC ships anchored after departing from Batavia, before leaving for Holland, and vice versa. In Dezima, the first German resident was Philip F. von Siebold (1796-1866) and in Dezima also introduced the "Science of the West" Rangaku (Dutch Science), which was the forerunner of Western science development in Japan. In Batavia, there was also Western Medicine in Doctor of Java School as forerunner of medical science in Indonesia. This paper focuses on the elaboration of the background of early development of Western science in Japan and Indonesia, through Dezima and Batavia.*

Keywords: Dezima, Batavia, Edo, Rangaku, Doctor Java School

1. Introduction

Until now Ports in terms of History and its various functions have been extensively researched, compared to studies of politic, economic, trade, social, war, diplomacy. Since long time ago, ports have been instrumental in various political, economic, social and ideological changes even as hub for school and science. Dezima (出島) in Nagasaki Japan and Sunda Kelapa in Batavia (Jakarta), Java, were two ports linking Indonesia in the Dutch colonial era with Japan in the Edo era through trade and as hub for school and introduction of Western science, especially in the 17th-18th centuries¹.

The meaning of Hub in this paper is a liaison that is used as a source of foothold in the development of widespread traffic. Today, the science hub is no longer a particular port or laboratory, but an Internet medium. Various innovations, new research findings of various fields of science have been sought on the Internet. However, tracking the development of the history of the science of the past is very relevant as a basis to see and understand the innovation and revolution of science, related to creativity and human intelligence since the previous generation until the latest generation. Port, thus

¹ Studies on Western science in Japan are Togo Tsukahara's Master's thesis (1985), "A Study of the Beginning of Chemistry and Chemical Education in Japan," with special reference to the contribution of Ph. F. von Siebold and H. Burger in the first half of the nineteenth century, Tokyo: Tokyo Gakugei University, and a conference paper, Togo Tsukahara (1994), "The Dutch Commitment in its Search for Asian Mineral Resources and the Introduction of Geological Sciences as a Consequence," in *The Transfer of Science and Technology between Europe and Asia, 1780-1880* (Proceedings at the Occasion of Second International Conference on the Transfer of Science and Technology between Europe and Asia 1780-1880), Kyoto: International Research Center for Japanese Studies, pp. 197-228. See also: www.sieboldhuis.org/en/hetsieboldhuis

become a mean or hub for the dissemination of science rather than inter-regional or continental trade.

2. Literature Review

2.1 Port of Dezima, Japan

Dezima, is a small artificial island at the western tip of Nagasaki city of Japan. In the seventeenth century, Dezima became transit port of VOC² merchant vessels during its sail from Ambon, Batavia, Siam, before finally returning to the Netherlands. Sunda Kelapa and Dezima are important ports in trade and the introduction of Western science since the mid-17th century. Dutch merchant ships were not the first ship docked on the coast of Japan, because half a century earlier in 1545, Portuguese ship anchored on the island of Tanegashima. In Japan, at the time, there were raging wars between landlords (*daimyo*, 大名). The period of war is known as *sengoku jidai* (戦国時代, war time of the whole country) in the framework of the struggle for influence and feudal region hegemony.

The Portuguese ships were not only ridden by intercontinental traders, but also by missionaries who undertook the mission of spreading Christianity from the Jesuit Order. The ship also loaded firearms for trading. Oda Nobunaga, who reigned at that time, initially refused Portuguese ships anchored, except in return for the sale of firearms. Before VOC ships docked in Dezima in 1600, there was also a Dutch merchant ship named *Liefde* under the command of the Englishman Captain Will Adam, who docked at Utsuki Bay, Kyushu, in the western part of the Japanese archipelago. The *Liefde* expedition aimed to drive out the Spanish and Portuguese people in Africa and Asia,

² *Dezima*, (also known as *Dejima*, *Deshima*, *Desyima* 出島), VOC = *Vereenigde Oost-Indische Compagnie*

and return upon bringing spices, especially pepper from the archipelago, which is the main commodity in the European market³. This Liefde event was an early opening of Dutch trade relation with Japan, in the next development, the Dutch even managed to maintain its trade monopoly with Tokugawa Bakufu (徳川幕府, 1603-1868). Hendrik Brouwer - who previously served as Governor General of the Netherlands in Batavia - was assigned to fill the position of Head of Commerce in Hirado Japan, replacing Jacques Specx in the year 1613, managed to make trade contacts to the Japanese government at that time, Edo⁴.

Oda Nobunaga (1534-1582) a daimyo from Owari (Nagoya, now) - had an ambition of uniting and controlling Japan - granted Portuguese ship licenses to anchor in Japan as part of a war strategy. Oda Nobunaga also permitted the spread of Christianity in Japan as exchange for Portuguese ships and merchants to supply firearms to Oda Nobunaga⁵. There were three great leaders who are ambitious to unite and control the Japanese. They were Toyotomi Hideyoshi (1537-1580), Oda followers, and Tokugawa Ieyasu (1543-1616) who managed to unite Japan and also established the Tokugawa Bakufu Military Government⁶. As the successor of Oda Nobunaga, Toyotomi Hideyoshi was quite tolerant of Christianity until the policy trapped him in contradictory conditions and endangered his power. On the one hand Toyotomi was unable to control the increasing and aggressive Franciscan missionaries while on the other hand, he also failed to control radical Buddhists who attacked him. This condition could not be solved which eventually ended with his fall from political power.

Unlike Toyotomi Hideyoshi, Tokugawa Ieyasu was anti-Western especially Portuguese and Spanish⁷. Ieyasu regarded Portuguese and Spanish missionaries as a threat to the stability of the state and ultimately prohibited the spread of Christianity in Japan in 1587 and this condition was correlated with Sekigahara's war between the Toyotomi Hideyoshi strongholds against the Tokugawa stronghold⁸. In order to avoid propaganda for the spread of Christianity in Japan the Great General (*Shogun*, 将軍) of Tokugawa Iemitsu in 1634 ordered the Bakufu apparatus to create an artificial island in Dezima, near Nagasaki, in an attempt to isolate Portuguese merchants docked in Nagasaki, in order not to mingle with the locals. However, after the explosion of Christian uprising in Shimabara-Amakusa⁹, the Bakufu Tokugawa government decided to expel all Westerners in Japan, except for the Dutch who were VOC employees, who previously settled in Hirado.

VOC then built trading office in Dezima with a Director and a clerk of about 10 people. Two Dutch ships regularly docked in Dezima each year. In Dezima, information and knowledge from the West then introduced. In addition to carrying books and information from European countries, these merchant ships carry commodities such as silk from China, pepper, cloves, sugar and others from Batavia and upon returning to Europe bringing famous Japanese products such as goods porcelain and Ceramics from Arita and Amari, which were very popular in the Netherlands and other countries in Europe at that time¹⁰. The flow of commodities and spread of information and science were "new" at that time along with the rapid trade between the continents

In 1613, the VOC established trade relations with Siam (Thailand)¹¹. For approximately two and a half centuries since Tokugawa adopted the *Sakoku* (鎖国) (Closed Door) policy, the Netherlands took advantage of this opportunity for trade monopolies with Japan, especially on *Bakufu* quota for export and import commodities. Initially, commodities traded by the Netherlands were silk, cotton and medicinal materials from China and India, brown leather and hyu leather from Taiwan. In addition, the Netherlands also provides books and the tools of science into Japan. Dezima, which brought huge profits to the Netherlands and *Bakufu*, also became a hub of Japanese science. During the late 18th and early 19th century, the Dutch sold about 10,000 foreign science books on various topics in Dezima. This amount was a significant amount at that time. It could be said that, *Rangaku* scientific sources (Dutch Studies), centered on Dezima as its hub. However, since the Tokugawa *Bakufu* opened its harbors by Commodore Perry arrival from USA in 1853, the trade monopoly between Bakufu and Holland ended in 1854. It carried out an isolation policy for 260 years, where Dezima is the VOC's trade office in Japan as well as a science hub in Japan.

Although the monopoly of Dutch trade ended, the introduction and in-depth research of Western science continued in feudal territories before the introduction of Western knowledge into Japan. Japanese learned were accustomed to the study of external influences, ranging from Buddhist teaching, Confucianism and Western science are disseminated simultaneously with the intercontinental trade and the spread of Christianity in Japan.

2.2 The Port of Sunda Kelapa and Batavia

Since the 12th and 13th centuries, many foreign trade vessels especially Portuguese arrived at trading port of Sunda Kelapa, Aceh and Makassar. Sunda Kelapa Harbor was originally the main trading port of Padjadjaran Kingdom in West Java serving the capital of Sunda (West Java) in Pakuan (in present Bogor). In the early arrival of the Portuguese, there was no refusal of foreign ships as happened in Japanese ports. European traders were generally very interested in high-quality pepper production traded in the Indonesian ports.

³ Lecture by Hans Brinckmann at the Tokyo National Museum, under auspices of the Japan-Netherlands Society. November 12, 2008. <http://www.habri.co.uk/erasmus-de-liefde> [Accessed, March 16, 2018]

⁴ https://en.wikipedia.org/wiki/Hendrik_Brouwer [Accessed March, 18, 2018]

⁵ See: I Ketut Surajaya, Pengantar Sejarah Jepang, Fakultas Ilmu Pengetahuan Budaya, 2011, *passim*.

⁶ Ibid.

⁷ Ibid.

⁸ Ibid.

⁹ Known as (Shimabara no ran=島原の乱)

¹⁰ I Ketut Surajaya, Ibid.

¹¹ See worldhistoryconnected.press.illinois.edu/3.3/gilbert.htm.

When there was a conflict between King of Padjadjaran, Prabu Surawisesa, and Sultan of Demak, the Portuguese provided military assistance and support to the king of Padjadjaran in exchange for economic and political agreements in 1522, where the Portuguese had the power to manage port and pepper trade; other than that the Portuguese also had privilege of being domiciled in Sunda Kelapa. Such was the political typology of the kingdoms in Indonesia in that century, meaning that they were hostile to political reasons and territorial domination; as is also the case in Japan.

In Japan, Portuguese ships also docked at Tanegashima in 1545, as mentioned above, for willingly selling firearms to Oda Nobunaga who faced great battle to grab hegemony and expanding the influence of the landlord area. At the time Tokugawa Ieyasu came to power, Portuguese ships were eventually driven out by Ieyasu because the ships which also transported missionaries and the spread of Christian in Japan which "disturbing" the Bakufu Government.

In Indonesia, year 1527, Fatahilah on behalf of Demak Kingdom, attacked Portuguese in Sunda Kelapa and managed to seize and occupy the harbor on June 22, 1527. The name of Sunda Kelapa was later changed to Jayakarta, and finally under the authority of the Sultan of Banten. The Portuguese ships were banned at the port of Jayakarta. There was an analogy between Japan and Indonesia that Portuguese ships were prohibited from docking in Japanese ports and Indonesian ports. Prohibition in Japan was based on the reason of "spread of Christianity" while in Jayakarta was based on "trade", aside of many other factors. In 1619, Jan Pieterszoon Coen, chairman of the VOC occupied Jayakarta port from Sultan of Banten. The name Jayakarta was then later replaced by Batavia and the port of Jayakarta served as a trading port of VOC merchant ships. After the opening of the Suez Canal, the Netherlands made a new larger harbor in Tanjung Priok to accommodate more merchant ships. After the independence of Indonesia, the port of Jayakarta has been renamed as Sunda Kelapa Port, and the former warehouse near Sunda Kelapa harbor is now a Maritime Museum building¹². The opening of new harbor in Tanjung Priok was related to the opening of Suez Canal in 1869. The line was much shorter than the Portuguese line and the previous Brouwer line¹³. The special impact with the opening of Tanjung Priok harbor by VOC was the limitation of local shipping lanes to the Archipelago islands, so that the Batavia-Aceh-Dezima-European trade voyages were dominated by VOC merchant ships.

Western sciences were not introduced to local Indonesian since the beginning of the colonial period, while Japan was not being colonized by any foreign nation. The rate of development of Japanese science (prior to the introduction of Western science in Dezima) was sufficiently advanced, so

that with the introduction of Western science through Dezima, it could be said that "transfer of scientific knowledge" in Batavia did not occur because the colonial intellectual elite had not acquainted with the "scientific knowledge" mindset. This gave the colonial government more opportunities to introduce Education or "enlightenment" to the colonial elite who focused on verbal communication and rules that were oriented to the interests of the colonial government. This background had an impact on the late development of science in Indonesia compared to Japan. In Indonesia, Western science, especially medical science newly pioneered in 1849 through the School of Doctor in Java¹⁴. The introduction of this education began especially in Batavia as a hub followed in other colonies, with the establishment of schools in several places.

The School of Doctor for indigenous children was not in the same context of "transfer of science and knowledge" as what happened in Japan, but rather the "reluctance" of the Dutch colonial government to confront indigenous colonies after being infectious by smallpox. The Doctor Java School students are prepared to carry out and deal with smallpox patients directly. The positive impact of the establishment of the School of Doctor for the development of science in Indonesia was that subconsciously the students of Doctors Java School, have become acquainted with the modern medical system of the Netherlands.

2.3 Terakoya and Rangaku

In the 17th and 18th centuries, the Netherlands was the richest and most developed economics in the field of science among the European nations, so the Dutch had a special position in spreading Western science to Asia, especially to Japan and Indonesia. Togo Tsukahara in his study concluded that the Netherlands was very interested in exploiting natural resources with its trading partners. Therefore, the Netherlands is also very diligent to explore, research, among others carry out a survey of coal mines in Japan and trying to raise the cultivation of tea seeds are smuggled from Japan to Java¹⁵.

Dutch or Rangaku (蘭学)¹⁶ Science was developed and subsequently disseminated throughout the feudal province. Between 1804 and 1829, schools began to open all over Japan by *Bakufu*, including the *Terakoya* (寺子屋) school which became the foundation for the spread of science in the following centuries, including *Rangaku* (Dutch Science or Studies). Thus Dezima also became a hub of *Rangaku* schools in Japan. In the following years, Dutch scientists were allowed to live among Japanese. A German physicist named Philipp Frans von Siebold, who joined the Dutch delegation and settled in Dezima, established a good

¹² See, History of Port of Tanjung Priok, <https://www.revolvy.com/main/index.php?s=Port%20of%20Tanjung%20Priok> [Accessed March 18, 2018]

¹³ In 1611, Hendrik Brouwer on his sail to Dutch India tried new route not based on Portuguese route, which was used by Dutch fleet all the time. https://en.wikipedia.org/wiki/Hendrik_Brouwer [Accessed March 18, 2018]

¹⁴ Known as Doctor Java School, see Sejarah Universitas Indonesia. (History of Universitas Indonesia), 2010, Universitas Indonesia, *passim*.

¹⁵ Tsukahara, Togo, EASTM, 40 (2014), p. 46. Smuggling of tea seeds was conducted by Siebold who was also expert in botany

¹⁶ *Rangaku* stands for *Ran* as saying for *Oranda* (Holland=Belanda), and *gaku* means science. *Rangaku* was used in general to identify Western scientific knowledge. In *Dezima Rangaku* was developed for first time and spread into Japan

relationship with the *Terakoya* students. Siebold often invited Japanese Scientists to his residence in Dezima and introduced Western science of knowledge to *Terakoya* students. As a scientist of physics, biology and botany, Siebold also learned a lot about Japanese society and culture and customs including interested in geology, natural content such as rocks and Japanese plants¹⁷.

In 1824 Siebold established a medical school-level "course" near Dezima, a suburb of Nagasaki. In a short time the "*Course Narutaki*" (*Narutaki-Juku*, 鳴滝塾) built by Siebold thrived and became the meeting place for about 50 students from all over Japan. Through medical education, they also translate the science of Siebold into Japanese.

Since its inception, *Rangaku* had a widespread impact on the feudalistic way of thinking of the Tokugawa people in a more scientific direction. This factor also provided a stiff opposition from Buddhist teachers who have developed Education in temple-based schools (*Terakoya*) based on Buddhism Education. *Terakoya* appeared around 17th century which is an educational facility built on the site of Buddhist temples. The Shogun, as supreme ruler of *Bakufu*, realized that *Rangaku* developed in Japan was very useful in many ways, ranging from medical science, engineering, astronomy, physics and others. In this case *Bakufu* wanted the real contribution of *Rangaku* activists especially the "western astronomy" that the *Bakufu* Government desperately needed. For a very long time - before *Rangaku* - the much-needed "calendar" in agriculture was based on the expertise of astronomers from China and Japan based in Kyoto. With the establishment of the Astronomy Bureau at Edo, which was more competent in the field of *Calendrical* science than the traditional "calendar of science" centered in Kyoto, it is politically and culturally, the prestige of the Shogun was stronger than ever. In addition, astronomers - who spoke Dutch - can be used in solving the problems facing *Bakufu*. *Bakufu* also instructs astronomers to learn Russian and Manchu which were used as *Bakufu* device in the face of problems that can arise in the northern border region of Japan. The Office of the Astronomy Bureau also served as the Center for Translation and made easier for *Bakufu* to control and attracted *Rangaku* experts in the Government. In Edo, astronomers continually deepen the science of the Chinese calendar by collaborating with Western astronomy. European Astronomical Theories by Copernicus (*Copernicanism*) as well as Newton (*Newtonianism*) theory entered Japan and were translated in Dezima, Nagasaki, by experts or Japanese amateur astronomers.

With the introduction of Western astronomy in Dezima, the fierce debate among astronomers involved, among other things, the concept of Chinese Yin-Yang cosmology, which stated that the sky was positive and the earth was negative, the sky was unanimous and moving, and the earth was tetragonal and quiescent in diameter was opposed by

Copernicus's theory¹⁸. On the other hand, and vice versa, there was no opposition to the concept of *heliocentrism* on the Sun God in Shinto and Great Sun (*dainichi*) in Esoteric Buddhism. With the introduction of Western astronomy in Japan, it was realized that Japanese astronomical theories was still very simple, after being influenced by Western Astronomy in the Edo period. The principles that hindered the development of *Rangaku* and turned out to be among the areas of expertise, *Bakufu* himself considered it a technically and utilitarian complement to rules, harmony, and intellectually in accordance with the ethical system referred to by Neo Confucianism Zhu Xi¹⁹.

In 1839, the *Rangaku* scholars (*Rangakusha*, 蘭学者) were strictly prohibited by *Bakufu* doing his activity, known as *Bansha no gaku* (蛮社の獄), which means the society's savings because it was considered to be learning something barbarian. Prior to the Edo period, Education was primarily aimed at samurai class boys, but after the development of a merchant class in mid-Edo, *Terakoya* began accepting students of merchant class boys. *Terakoya* in its development also built in major cities such as Edo and Osaka. At the beginning of its establishment, *Terakoya* was more prevalent in the interior than in the coastal port area.

Meiji Era came (1868-1912) and *Terakoya* began to be replaced by government schools, based on the Government Education Regulation (*gakusei*, 学制), at the beginning of the Meiji Age. Based on *gakusei*, western curriculum was developed based on science and technology on one hand and on the other side, education in *Terakoya* was focused on learning arithmetic by using abacus (*soroban*), history and geography. Girls are taught tea ceremony (*cha no yu*), flower arranging (*ikebana*) and handicraft techniques for household use. Moral education, calligraphy, literacy, reading textbooks (*orai mono* = 往来物) i.e. books in kanji writing with katakana combinations are also taught in *Terakoya*. *Terakoya*'s teachers come from Buddhist leaders, as well as samurai factions. Some *Terakoya* schools were run by Shinto leaders and doctors. Beside *Terakoya*, there was also a Han's school (*Hankou*, 藩校). This school was generally established in each of the feudal provinces of *Han* (藩), students composed of samurai boys, as well as teachers composed of samurai classes. In the Edo period there were 270 Feudal Provinces (藩) throughout Japan. In the *Sakoku* period (the Tokugawa Isolation Policy (1639-1853), all information from the West must be communicated through the Dutch language. Therefore, thousands of books entered through Dezima and translated into Japanese, are considered to be Dutch, who entered from the West classified as *Rangaku* (Dutch Science).

Rangaku's main content was medicine and astronomy. Medicine was classified into: plant-science (botany),

¹⁷ https://en.wikipedia.org/wiki/Philipp_Franz_von_Siebold Philipp Franz Balthasar von Siebold (17 February 1796 – 18 October 1866) was a German physician, botanist, and traveler. He achieved prominence by his work...[Accessed, March 18, 2018]

¹⁸ *Tenchinikyuuooohoo*, 天地二球用法 (Theory of Sky and Earth) by Motoki Ryooei (本木良永) also published in 1770s was benchmark for heliocentric theory of the universe. Sugita Genpaku and Motooki Ryooei books were "icon" of medicine and astronomy in Japan in 18th and 19th century. (Tsukahara, Togo: opcit., p. 48)
¹⁹ See: <http://www.columbia.edu/~wtd1/w4030/sjt/Ch29.pdf>, p.525-527 [Accessed March 18, 2018]

pharmacopeia, mineralogy, chemistry of physics and zoology. While astronomy was classified into science of calendar, research, cartography and geography. The *Rangaku* experts were very enterprising and focus their attention on the field of applied technology that can soon be implemented in Japan²⁰.

During the implementation of the isolation Policy, *Bakufu* rulers were very interested in technology, but also very restrictive and limited to the history of Europe, philosophy, law, literature and religion (Christianity). This restriction was based on the bitter experiences and fears of the *Bakufu* rulers against Vatican-oriented Christian influences. The *Rangaku* advocates were intellectuals who have also formed the thoughts and teachings of Neo Confucianism, except that *Rangaku's* reach was much wider and free in conducting investigation of social problems than Neo Confucianism²¹.

One of the Meiji government's policies in adopting western science and technology was expressed in the slogan of "*Wakon Yousai*" (和魂洋才, Japanese moral Western technology). *Rangaku* became a bit outdated. The government intensively sent young people to study in western countries or the government invited and paid Western experts to educate Japanese children in formal schools (*Yatoigaikokujin*, 雇い外国人) in effort to modernize Japan from the West especially in science and technology. *Rangaku* - unwittingly by the *Bakufu* government - eventually ushered in Japan for easier and quicker adoption of Western science and Western technology transfer with Japan-specific methodology. Nevertheless, *Dezima* remain a forerunner to the Western Science Hub even though Education in *Terakoya* is growing all over the country, the undamaged Japan has greatly developed western science: medicine, physics, botany.

2.4. School of Doctor and Colonial Schools in Indonesia

Philipp Franz Balthasar von Siebold - as already mentioned - once settled in Batavia then moved to *Dezima*. Prior to Batavia from Germany, Siebold moved to the Netherlands. In the Netherlands Siebold proposed applications for military doctor positions. This position allowed Siebold to travel to the colonial realm of Batavia. Previously he entered military service in the Netherlands on June 19, 1822. On a voyage from Rotterdam to Batavia he was appointed as a surgeon on the Dutch Admiral Adriana. On the voyage to Batavia Siebold improved Dutch Language Mastery and also studied Malay. During the voyage to Batavia, Siebold also collected and researched marine fauna. Siebold arrived in Batavia on 18 February 1823²². Arriving in Batavia he was placed in the house of the governor-general of Baron Van der Capellen in

recovering from his illness. At the home of Governor General, Siebold was acquainted with the head of the Bogor Botanical Gardens (Botanical Garden Buitenzorg), Caspar George Carl Reinwardt, Engelbert Kaemper and Carl Peter Thunberg (Author of *Flora Japonica*). The latter two are physicians and once resided in *Dezima*.

While in Batavia, Von Siebold became member of The Batavian Academy of Arts and Science. After around four months stayed in Batavia, Von Siebold was finally sent to *Dezima* on 28 June 1823 and arrived at *Dezima* on 11 August 1823²³. In *Dezima*, he taught medicine and also developed Japanese flora and fauna research. For approximately four months stays in Batavia, Von Siebold's activities in the field of science development have not been widely recorded, except for ever smuggling the tea seeds of Japan and cultivated in the Botanical Garden Buitenzorg (Bogor Botanical Garden, now) until 1833. He has been planted about half million tea tree trunks on the island of Java.

The change of Dutch colonial government policy in the 1840s and 1850s was marked by a change of colonial policy from the merchant's orientation to the ruler's orientation (from trader to ruler). This was demonstrated among others in the field of agricultural management with the implementation of the policy of *Cultuurstelsels* (Forced Cultivation)²⁴ followed by the policy of mining exploitation announced in 1850, related to the control of tin mining on the island of Bangka by Billiton en Singkep Maatschappij²⁵, coal and other natural resources such as petroleum begun to be major concern of the colonial government. Geological museums were also built in Bandung as "cathedral for scientists" in the colonies²⁶. Although university entered the field of mining as educational material since the 1860s and 1870s in the Netherlands followed by the publication of the Annual Journal of the Mining Department of the Dutch East Indies in 1872²⁷ but the discovery and development of science in the Netherlands was not immediately transferred to the local inhabitants of the colonies. In other words, the "enlightenment of the science" was oriented to colonial

²³ <http://davesgarden.com/guides/articles/view/2706>

²⁴ C. Fosseur (1988), "Tussen Daendels en Van Heutsz: Het Nederlandse bestuur op Java in de 19de eeuw" (Between Daendels and Van Heutsz: The Dutch Government on Java in the Nineteenth Century), in *Spiegel Historie* 23.10, pp. 413-419, dalam Tsukahara Togo, p. 67

²⁵ E. P. Wellenstein (1918), *Het indisch mijnbouw vraagstuk* (The Indian Mining Problems), Gravenhage: Martinus Nijhoff. (in Togo., Ibid)

²⁶ The concept of the "cathedral of science" See: Susan Sheets-Pyenson (1988), *Cathedral of Science: The Development of Colonial Natural History Museums during the Late Nineteenth Century*, Kingston & Montreal: McGill-Queen's University Press.

²⁷ On institution of mining in Dutch, See, Hans Stauffer (1945), "The Geology of the Netherlands Indies," in Pieter Honig dan Frans Verdoorn (eds.), *Science and Scientists in the Netherlands Indies*, New York: Board for the Netherlands Indies, Surinam and Curacao, pp. 320-335; and C. L. van Nes (1955), "De Delftse mijn ingenieur," in Adolph Frederik Kamp and Paul Huf (eds.), *Technische Hogeschool Delft 1905-1955*, 's-Gravenhage: Staatsdrukkerij en Uitgeverijbedrijf, pp. 256-269. (in Togo Tsukahara, p. 68)

²⁰ Western studies in Japan during 1770s was marked by the book entitled *Kaitaishinsho* (解体新書), (A New Book of Anatomy) by Sugita Genpaku (杉田玄白) et al. (see: Timon Screech, (1997), *Edo no jintai o hiraku* (江戸の人体を開く) (Opening the Edo Body), Tokyo: Sakuhinsha, dalam Tsukahara, Togo, op. cit., p. 48

²² https://en.wikipedia.org/wiki/Philipp_Franz_von_Siebold [Access ed March 18, 2018]

politics as tool of colonial domination in the colonies, especially in the Indies (Indonesia).

3. Problem Definition

What was the role of major trade ports, which was one of key hubs in the introduction and dissemination of science in the 17th-18th century? Did the rising and growing intercontinental trade to the seizure of commercial territory and colonial rule sustain the spread of Western science to the East? This issue was quite relevant because ports of commerce had important role as school hubs and the introduction and dissemination of Western science.

4. Approach

The approach used in this case study is the History approach. Descriptive method, critical analysis is conducted on data and source of History is selected strictly from various sources, such as previous research published in journals, books, current information obtained from Internet research, or various media. The result of Togo Tsukahara's research is the main reference in this case study.

5. Discussion

History of the development of science in Indonesia was not apart from colonial political policy and the history of colonial medicine education that began in Batavia since January 2, 1849.

The introduction of "medical science" was also as the implementation of colonial politics through science. Through Decision of Governor no. 22, colonial government established School of Doctor in Java on Weltevreden, Batavia, at a military 'hospital' now called the Army Central Hospital (RSPAD), Jakarta. What was the background of the colonial government establishing the School of Doctors of Java? Is it just as good intention or vice versa? Initially it was because of the reluctance or "disgust" of the colonial doctors to treat the indigenous population infected by smallpox that covered the whole body of the patient-causing odor that caused the doctors is reluctant to treat it. The outbreak of smallpox epidemic happened in the 1800s, in Java, was the backdrop of the colonial Government, which took the initiative in order for this type of disease to be handled by the natives who had been educated in the field of smallpox healing. This event was the embryo of the development of education in the field of medical science (medical science) in Batavia. The Doctor School's education was conducted at the Military Hospital with a length of education of two years. Although the graduates were given the title of Javanese Doctor, their academic and skill was only equivalent to the profession of "smallpox healer", while to obtain academic competence in medical science, it took at least ten years of Education²⁸. It was not until 1889 that a medical school called *STOVIA* (*School tot Opleiding voor Indische Artsen*) was established. The alumni were then called *Inlandse Art*. In the history of the

Indonesian National Struggle, the *STOVIA* Building was also the birthplace of the Movement of Budi Utomo, in this case, the introduction of Western science in Indonesia was very strong with political movements, both colonial politics and anti colonial politics. As it was known, School of Doctor in Java or Java Doctor School is metamorphosis of *STOVIA* that later were integrated into the Faculty of Medicine of Universitas Indonesia, in other words, Western science, especially medical science originated from Java Doctor School.

The introduction of Western education during the *VOC* period was a "new enlightenment" in addition to Education, which focused on Hindu, Buddhist and Islamic teachings that had developed two centuries earlier. The Calvinistic Order on Portuguese ships found Christian-based education after the *VOC* took control of the archipelago and in general the beginning of education was almost simultaneous with the beginning of the spread of Christianity. On 1607, in Ambon, there was the first Dutch school and within 25 years, the number of Dutch schools reached 16 schools and in 1645 has reached 33 schools. The primary mission of these schools is to spread the Protestant religion of the Calvinist school. Furthermore, in other areas of the archipelago, already established Hindu, Buddhist and Islamic, began to be overseen by the Dutch government. Since the bankruptcy of *VOC* and colonial government controlled Indonesia in various aspects, Dutch school was found with discriminatory educational ideologies. The main goal of the colonial government school in various regions was for the colonized elite to obey colonial rules favoring the colonists, not educating the native elite in the fields of science as in Terakoya and Rangaku Education in Japan, free from the influence of Western colonial rule. The fundamental equation of Rangaku and the Education of Doctor in Java was the development of scientific logic, which has a positive impact.

For the case of Japan, there was awakening of public on feudalistic domination and exploitation of Tokugawa regime against Japanese society itself. In Indonesia, the spread of medical science through Doctor Java School had positive impact on the political movement of Indonesia, where the Dutch anti-colonial politics underlies the ideology of nationalism primarily by the organization of *Budi Utomo*. The increasing number of Dutch families in the Dutch East Indies, especially in Batavia by 1817, forced colonial government to establish special elementary school for the children of the Dutch nation known as the *ELS* (*Europeese Lagere School*). Of course the language used in schools was Dutch, with the curriculum references in force in the Netherlands. With this kind of discrimination, indigenous children could not become *ELS* student. In other word, colonial political policy in the field of education was the implementation of strict supervision of religious school, especially boarding school (*pesantren*), not Christian religious school. Nevertheless, the ideology of colonialist normative education was still carried out in these schools and does not develop science-based education.

²⁸See: Sukarya, Somadikarta, at.all, Sejarah Universitas Indonesia, Universitas Indonesia, 2010, *passim*

With the establishment of *Pristerraden* in 1882²⁹, as well as another regulation known as the *GoeroeOrdonnantie* in 1925, it was reaffirmed that the *Kyai* who provided Islamic education in *pesantren* should reported themselves to the colonial government. The religious teachers who are subjected to this report must be subtly pressed and also intervention in an effort to reduce anti-colonialist ideas that are mainly taught in *pesantren*, as well as to seek the sympathy of the indigenous population in the elaboration of implementation of colonial politics.

Unlike the Edo-era of Education, *Terakoya* and *Rangaku* System, which aimed to educate and sow the scientific thinking of the common people. The colonial education in the Indies was precisely dualistic in that it clearly separated this system of education into the European school system (which generally included the foundations of science) and the native (more normative colonialist) school system. Changes in the school system took place under Governor-General Van Heutsz's administration. The education system began to be directed to the common people in form of village schools. The Restructuring of Education in the Indies occurred in 1892, due to the need for graduate schools to serve colonial government offices at the lower levels with ability to speak Dutch. Thereafter, *Eerste Klasse School* was built for the noble (*priyayi*) children with Dutch lesson. *Tweede Klasse School* was made for the common people without Dutch lessons. Graduates of this school were generally placed in the offices of village officials (*Pamong Praja*). *Eerste Klasse* was for indigenous children where they were educated for a year and at *Tweede Klasse* the indigenous children were educated for three years. Teaching materials were provided in form of reading, writing and numeracy skills. These skills were primarily needed to assist low-level administrative tasks of the Government with low salaries. After the adoption of "ethical politics" pioneered by Baron van Hoevel and Conrad van Deventer, there was a change in the schooling system, from one year to five years, and from three years to six years. The school was known as *Schakel School (SS)* and *Holland Inlandsche School (HIS)*. These schools actually sharpened the social strata, because those who were allowed into HIS were children of the upper and lower nobles, while the children of the common people were not allowed to be students in this school. In addition to HIS, the colonial government also made the *Eropesche Lagere School (ELS)* at elementary school level for children of European descent and Chinese descent. Social discrimination greatly colored these schools. Those who graduate from HIS and ELS could continue education to *MULO* school (*Meer Uitgebreid Lager Onderwijs*) at the Lower Secondary level. The teaching materials provided at *MULO*, in addition to Dutch, were also English and French. The specialty of *MULO* graduates was that they are allowed to work as "colonial government employees" at the lower levels, or became soldier of the Colonial government. In the upper secondary education stratum, the colonial government established *AMS (Algemens Midlebars School)* and *HBS (Hoogere Bourgere School)*. Those who are allowed to enter these schools are the noble children of the upper class.

In contrast to the educational ideology in *Terakoya* and *Rangaku* Japan, which is oriented towards activities to educate the public and the development of the state, and inculcate scientific thinking, the ideology of education in colonial Indonesia was oriented to the improvement of working skills in various sectors, among others, as a worker, plantation worker or lower-level foremen on the estate and other second- or third-grade jobs. In schools the elite of the people who adhere to the rules or laws of the colonial government also engineer it. These elites are expected by the colonial government to support political, economic and colonial social interests. Feudalistic local cultures are still preserved by the colonial government, especially the values and cultural activities that are status-quo in social relationships that follow the layered social strata, rather than consciously mingling the basics of scientific thinking (scientific thinking).

6. Conclusion

Some things can be inferred from this paper. Dezima and Batavia's trading ports are the hub of Western science recognition and schools to Asia (Japan and Indonesia). The introduction of Western science in Indonesia and Japan differs substantially, i.e. in Japan is scientific egalitarian, freer, because Japan is not a colony. While the introduction of Western science in Indonesia is in line with the importance of profit-oriented colonialism and the exploitation of nature's imperatives, it is not a "transfer of technology" and "scientific thinking" as in Japan. The introduction and dissemination of Western science in Japan is more of a scientific approach, whereas in Indonesia, it is more a normative colonial political approach. Dezima in Japan and Batavia in Indonesia, apart from being a trading port is also a hub of school and science of the West in the 17th-18th century. Introduction of Western science in Indonesia started in Doctor of School in Java, which is none other than Faculty of Medicine of Universitas Indonesia.

7. Future Scope

The problem of today's science hub is no longer a trading port, but various research laboratories are disseminated rapidly and widely through Internet information technology. Nevertheless the trading port remains a great service as the hub transforms Western Science to the world, including Indonesia and Japan. As a trading port the port functions are increasingly multi-dimensional as the main global economic supporter (bordered economic spear)

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²⁹See: <https://www.jstor.org/stable/312333>

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