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**VIETNAM DURING THE FIRST HALF
OF THE 19th CENTURY:
SCIENTIFIC AND TECHNICAL THEORY
AND THE REALITY OF THE COUNTRY REVISITED**

Abstract. Being considered as the last and longest ruling family in the monarchical history of Vietnam, there are so far a good number of researches on Nguyễn Cochinchina and the Nguyễn Dynasty based on dimensional approaches and new materials. Nonetheless, history of Vietnam from the standpoint of science and technology in fact remains unstudied.

The purpose of the article is to reassess the scientific and technical theory and the reality of Vietnam during the first half of the 19th century in the main contents: (i) knowledge-building, scientific and technical potentials; (ii) national situation in terms of seapower and ability facing technical achievements; and (iii) a critical point of Vietnamese science and technique at the time.

Keywords: Vietnam, France, Science and Technique, Nguyễn Dynasty, 19th Century.

Introduction

Prior to mid-19th century, the Vietnamese army confronting with the Western army for the first time faced a great challenge. The victory of the French expeditionary forces displays the victory of an advanced scientific and technical society over an agrarian one. Having signed treaties, the Nguyễn court gradually acknowledged the French protectorate for a long time.

When Gia Long [嘉隆] (r. 1802—1820), the first Emperor of the Nguyễn Dynasty (阮朝), ascended the throne, he continued to keep the relationship alive with the West in order to reaffirm Vietnam's position in the region. In the first decades of the 19th century, the Nguyễn Dynasty gradually gained the necessary political stability and soon learned about the civilization in the Western hemisphere. It was the emergence of new factors that could help reform the country thanks to a wise and modernized foreign affairs policy while taking up Western technology.

In course of time researchers recognized the traditional perception of the Nguyễn Dynasty to be generally “conservative”, because it was tied up with the Confucianism, refused to adopt Western culture and did not go beyond the tradition; it was even called “reactionary” when it easily succumbed to foreign aggression, thus becoming a traitor of the nation. These remarks are primarily based on the “unsuccessful” attempt of Emperor Tự Đức [嗣德] to protect the sovereignty, independence and the territorial integrity. During 1840-ies and 1850-ies, statistical data show that dozens of ships from the West arrived in Vietnam with purposes of not only trading and demanding for the abolition of religious prohibition but also encouraging the act of provocation and the yoke [Đại Nam thực lục 2007].

As for the Vietnamese historiography, great researches of the official history of Vietnam brought into the public since 1970-ies by the Institute of History, or national bodies of historical studies and training seek to confirm that Vietnam lost its independence due to the Nguyễn Emperors' mistakes, especially under Thiệu Trị (the third Emperor) and Tự Đức (the fourth Emperor).

Otherwise, and for further details, foreign scholarship (both French researchers of the colonial period, and European and American historians) seeks to explain Vietnamese history of the 19th century from political, cultural, economic, social and military approaches, as ruled by an outdated/underdeveloped oriental regime, which conserved the stagnation and the weak military background in every way.

The purpose of the article is to revisit the Vietnamese scientific and technical theory and the reality of the country in the first half of the 19th century from the point of view of the history of science and technology¹.

Knowledge-Building and Scientific and Technical Capabilities

During the time when having ascended the throne, Emperor Minh Mệnh [明命] strengthened centralized institutions, gradually isolating French senior officers, suppressed the Christian-related rebellion, and was more active in cultural and political exchange with the West. The Opium War in China broke out, causing the second Emperor of the Nguyễn Dynasty to face two issues: the first related to the future strategy of foreign policy towards the West, while the second touched on reforming the country.

Under his reign, Emperor Minh Mệnh time and again sent his diplomatic missions to Penang, Calcutta, Batavia (now Jakarta) and so on, on the “merchant ship” to Southeast Asia for extending a wide range from China to India [Youn Dae-yeong 2016]. The ship traveled to Guangdong (China). When they returned, they reported that British military had intervened in the Chinese military and plotted the expansion of Western countries. Also, time and again Minh Mệnh discussed the events and impacts of the Opium War [ĐNTL 2007-5: 707, 808; Yu Insun 2009]. In addition, he sent a mission to Paris and London to seek and get more information². The mission went to Western Europe, but did not obtain the cooperation from European countries; thus, it failed to get the expected results and the mission returned when Minh Mệnh had died.

In 1844, during the reign of Emperor Thiệu Trị's, Đào Trí Phu was sent to Batavia to buy a relatively modern steamship³. In 1845 the Emperor was proposed the project of “The Imperial Military Examinations” [武舉規程], and the physical training and martial arts practice were approved in 1846 [ĐNTL 2007-6: 456, 529, 674]. Furthermore, the method of military training, the regimes of military examinations and official reorganization had been issued and revised. As a result, in the summer of 1846, the court promoted a detailed program of reforming the military examination system to enhance the capabilities of fighting against Western intervention [ĐNTL 2007-6: 881—899].

When Emperor Thiệu Trị [紹治] had ascended the throne, his attitude toward Christianity took a turn for “tolerance”. But the change of the Thiệu Trị Dynasty was strongly impacted and fell into “deadlocked” situation when in 1847 the French navy fired at the Nguyễn Dynasty's navy fleets. In response to this act of the French, Thiệu Trị demanded that all the Christians would be executed [Lê Thành Khôi 1955: 342—343], still insisting that “Christianity is the false worshipping, its enchantment [one's heart] is deep, there should be many ways to remove it, just take it easy and ignore it. We do good when change their wrong-doing. If we hastily apply the execution, have we

¹ This research is also a part of the scientific project of the state-level key science and technology program of 2016—2020 (KX.01/16-20) titled: “Problems of Crowd Effects in Social Development Management in Present-Day Vietnam” (KX.01.47/16-20).

² In November 1840, the envoy came to France, but he was not welcomed by King Louis Philippe. The same happened when the envoy came to London [Delamarre 1920: 241; Delavaux 1928: 257—264].

³ In the autumn of 1844, Đào Trí Phú, Ministerial Advisor, returned from Europe in a boat with a steam-engine, which cost more than 280,000 *quan* (貫). The army was equipped with muskets [ĐNTL 2007-6: 627].

anything else to do?” [ĐNTL 2007-6: 1003]. In spite of Emperor Thiệu Trị’s order to execute every European in Vietnam [Nguyễn Xuân Thọ 2016: 47] during his reign no European missionary was put to death. War ships arrived in Vietnam in 1840-ies, some ships were built there in the late 17th and the early 18th centuries, otherwise the French attack in 1858 would have differed in features, scale and equipment.

Especially many ships were built during the reign of Emperor Minh Mệnh¹. Some of the biggest ships only were 30 meters long. In 1839, the court ordered to build a new type of ship named Thanh Loan, its length was 9 *trượng* 5 *thước* (about 40 meters), its width 1 *trượng* 1 *thước* 2 *tấc*, its depth 1 *trượng* 7 *thước* 1 *tấc*². In 1840-ies and 1850-ies, engine ships were sunk and broken one after another after a short time of overloaded use. The government seemed to have had insufficient funds and was not able to repair them in the years, when ship-building was most likely an experiment.

The Reality of the Country

Since Minh Mệnh’s reign, it has been emphasized that the Capital is the place where the mountains and the sea are united, the land is high and the river is calm. The place lies between the South and the North. In the waterway, there are the Thuan An and Tu Hien estuaries which are deep, while in the route, there are Hoanh Son Range [橫山關] and Hai Van Pass [海雲關] which blocks the area [ĐNTNC 2007-1: 13].

Being an outside exchange gateway, the strategic location of the Central region, including Đà Nẵng is supposed to be well known to the government. Besides Tran Hai Dai [鎮海臺] “the bay named Vung Son Tra [ĐNTL 2007-2: 759] has the worst geographical disadvantages.” “Đà Nẵng seaport is an important place, because it is the place where ships have to go through” [Minh Mệnh Chính Yếu 2010: 1636].

The state government required that the local authorities should immediately demand the troops to pay more attention to the mandarins who went back from abroad for business trips and temporarily transited in any county. If the mandarins had opium with them, they would have been immediately arrested and the exhibits confiscated. If the ship arrived at Đà Nẵng’s seaport, the sailor would have been interrogated by a mandarin of the local defense command. If the ship arrived in the Capital, the sailor would have been interrogated by two envoys of Bộ Binh [兵部, Military Ministry] and Bộ Hình [刑部, Justice Ministry].

After the military clashes in 1841 and 1847 in Đà Nẵng, both the court and local people gripped with emotions and fears of what happened next, dared not even dream of cultivating. During 1856, Western ships arrived and stopped at all the seaports including Thuan An and Tra Son [ĐNTL 2007-7: 504]. In early 1857, the imperial government prepared 2 mountain guns and 8 assault rifles for 2 temporary military bases in the Thuan An sea, sent mandarins to supervise the imperial city, forts and military posts of Đà Nẵng seaport, and hold sessions of shooting practice at the Thuan An seaport [ĐNTL 2007-3: 486, 489]. Regarding the fighting in Đà Nẵng in 1858, *Đại Nam thực lục* recorded shortly as follows: “The ships from the West (12 ships) arrived at the entrance of Đà Nẵng Port (in Quang Nam province) and bombarded the fortresses. When the Emperor had heard about it, he sent Trần Hoàng, the governor of Quang Nam and Quang Ngai, to call up the provincial army (2,070 persons) for active services when needed. He also called Commander Đào Trí

¹ The third year of his reign Thiệu Trị demanded for the planks for repairs: the length of 9 *trượng* 9 *thước*, the width of 2 *trượng* 3 *thước*, the depth of 1 *trượng* 7 *thước* 1 *tấc*.

² Obsolete Vietnamese length units are as follows: *Trượng*: 丈 = 4 m, *Thước*: 尺 = 40 cm, *Tấc*: 寸 = 4 cm, *Phân*: 分 = 4 mm.

for going to the citadel immediately with Lê Văn Phô, the Surveillance Commissioner, to keep an eye on the citadel. His father was Trần Văn Nhiếp, who fought for the citadel with Trần Hoàng” [ĐNTL 2007-3: 567].

Until 1860, Emperor Tự Đức [嗣德] tried the best measures for the fight against the French attack such as warring participation of good generals, encouraging the military troops in Quảng Nam, Đà Nẵng and the whole country, persistently watching out the enemy and so on.

In Đà Nẵng, having stopped the French army for a while, General Nguyễn Tri Phương gave up the strategy of “fast fight and fast victory” and having considered the strategy of “taking advantage of being on the defensive”, took the defense as a strategy and built more fortifications to gradually approach the enemy.” Emperor Tự Đức said that such a defensive strategy had “6 drawbacks”, while he wished to attack and beat the enemy for making a huge success” [ĐNTL 2007-6: 584; Phan Trần Chúc, Lê Quế 2015: 54—67]. It is noteworthy that Tự Đức’s official documents in volumes 93 and 96 of the 11th edition (1958) recorded the instructions of the Emperor for the deployment of military actions in Đà Nẵng [Lê Tiến Công 2018: 17—23]. The Emperor was “lost in thought day and night”. From mid-1859, the confidential information about the plan for fighting the aggressors showed the disorder in the imperial government, mainly due to discussions about which is better: to attack or to retreat, to make peace or to give battle. Eventually Tự Đức had to decide by himself. However, the Emperor himself was too confused to have a comprehensive plan.

According to Đinh Thanh Hiếu’s essay on textbooks (and examination topics) for the Imperial Palace Doctoral Examinations at the time, there are some noteworthy points [Đinh Thanh Hiếu 2013: 60—69]:

— First, along with the Cổ văn [古文, Classical books] and Kim văn [今文, Modern books] known as Thời vụ sách [時務策, Current political issues] the textbooks for the Imperial Palace Doctoral Examinations contain more pieces of information on the Nguyễn Dynasty’s administration and management. The textbooks are especially appreciated for the information on Tự Đức’s reign. The requirement for pragmatism in the imperial examinations had never been so urgent as at that time.

— Second, the textbooks for the Imperial Palace Doctoral Examinations contained pressing issues about war, peace/détente, and Christianity (or righteousness and superstition) and the issue of reforming the country.

Since 1858 till 1860, the policy of “peace” was limited in general due to the fierce resistance and heroism of Đà Nẵng population. Only having signed the peace treaty in 1862, the Emperor and the court were increasingly hesitated between war and peace, negotiation and fighting, “War, peace, surrender, retreat, which is the best?”. The court discussed vigorously and in order to get more opinions of the officials, this issue became a subject of exams, especially of the Imperial Palace Doctoral Examinations¹.

The exam book asking the question about Western technology made a compliment that “its sophistication conquers creation”, but noted that Western knowledge was not based on the principle of the Five Elements [五行]. Thus, it was “contrary to the ancients”. Western technology was “a monstrous thing”, originated from a saint; it “exploited things to serve”. In general, the outdated mood prevailed.

¹ Accordingly, the question in the exam in the year of the dog [Nhâm Tuất] (1862) is “Three strategies for fighting against the aggression are defense 守, fight 戰, peace/détente 和. Choice of any strategy depends on the people. There is both concord and discord about using one strategy or two at the same time. Which strategy can be used or taken out?” The question in the exam in the year of the dragon [Mậu Thìn] (1868) repeated: “The strategies for fighting against the aggression are not only defense-fight-peace. Based on the present circumstance, out of these three strategies, which cannot yet be used?” [Đinh Thanh Hiếu 2013: 60—69].

The Critical Point of Science and Technique

In a broad historical perspective, using sociological data and biographical facts, the researchers highly appreciate the level of science in the reign of Emperor Minh Mệnh and call it “the peak of knowledge” of the era [Vũ Đức Liêm 2018: 35—38].

It should be noted that during the reign of the powerful Emperor, public figures in Minh Mệnh’s era succeeded in establishing a post-war unified Vietnam, reinforcing the establishment of territory and developing economic and political relations as a powerhouse in Southeast Asia [Li Tana 2004; Nhung Tuyet Tran, Anthony Reid 2006]. However, this success had no continuation in the next decades when there was a demand for a new generation of intellectuals from a geopolitical, scientific, technical, military, and economic transformation perspective and economic and social changes [Vũ Đức Liêm 2018: 37—38]. Thus, when considering both scientific and technical corollaries and the reality of the country, there are two major stages which are Gia Long and Minh Mệnh periods (to some extent, it includes the short reign of Emperor Thiệu Trị for the later stages).

From a comparative point of view, it can be seen that in terms of time, Japan signed the first treaty with the United States in 1854, and in five years (1854—1858), successively signed treaties with 20 countries and territories. In April 1855, Thailand had to sign a diplomatic and economic treaty with Britain. In the following years, the Thai court had to sign similar treaties with the USA, France and the Netherlands [Vũ Dương Ninh 2007: 210—211; Nguyễn Văn Kim 2018: 75—89]. Thus, it can be concluded that Vietnam, Japan and Thailand had a relative balance of legal and economic autonomy.

As it has already been said, the reform attempt of Emperor Thiệu Trị to save the country reached a deadlock. Tự Đức’s successor did not have enough time to inherit and develop the reform policy that Minh Mệnh or Thiệu Trị had pursued. In a battle of 1847, the French were confident about their abilities to destroy the entire warship immediately [Taboulet 1955: 372—373]. The case of refusing to not open the letter and not to receive the letter from the court was a “tragedy” of diplomacy. After that case, the emperor “was often unhappy”. When he had free time, he went far away to Doan Vu Communal House to have a shooting practice, ordered his people to make grass figures in the shape of Western soldiers and the one who had hit a grass soldier would have been rewarded [ĐNTL 2007-6: 975—976, 984—985].

Ten years later, La Pierre on *Gracieuse* and *Victorieuse* fired at Vietnamese “small” battleships. Prior to the 19th century, the French attack would have been different in term of feature, scale and equipment. Some documents show that after having defeated some strongholds in Đà Nẵng, the French army saw a number of toil and copper cannons, but they seemed to be newly installed, or at any rate looked fairly new [Nguyễn Phan Quang 1999: 367—368].

Not only warships, but also muskets for the Vietnamese troops were produced in France and Belgium. The gunpowder produced in the UK could be purchased in Singapore, or Hong Kong [香港-Hương Cảng]. Usually, this equipment was obsolete and had the poor performance as far as the shooting range is concerned; the reloading and the flintlock did not function either. Probably, the guns were bought in the 1830-ies and 1840-ies and their quality was not equally good (during Minh Mệnh’s reign, thousands of guns given by the French to Emperor Gia Long were handed out in provinces) [Nguyễn Tường Phượng 1950: 52].

Although the Vietnamese artillery was known for its “precise aiming and skillful hitting” [Phan Trần Chúc, Lê Quế 2015: 50], there were rumors about its poor equipment. The cannon could only miss the target which made Đào Trì prefecture governor shoot several times at the same target. During the war, “the bullets from the Vietnamese side flew above our heads [so the French] and fell

in a pond behind us”. Meanwhile, building more forts and fortresses in Vietnam befitted the defense strategy [Luu Anh Rô 2005: 103—106, 112]¹.

Meanwhile, equipping the war with modern facilities², Tự Đức gave “Kinh Hồ Kiếm [Books teaching old tactics and techniques in the last thousands of years] to the auxiliary forces in Quảng Nam and Gia Định” [Luu Anh Rô 2005: 176], set out the war layout of archery, spear and sword, and other primitive *ruses de guerre*...

With the defense system which had carefully been planned out before the French attacked, R. de Genouilly admitted that “by setting out the war layout mentioned above, Annam government proved to be ready for the upcoming battle” [Luu Anh Rô 2005: 231]. However, during the battle, the defense system showed its weakness for it was ineffective, too vague and in need of constant restructuring³.

From the mentioned changes on the theory base of the *paradigm* of science by Thomas K. Kuhn, the replacement of a new paradigm is a continuous “revolution”: *Old paradigm — Normal science — Anomalies — Crisis — Revolution — New paradigm*⁴ process⁵. Prior to the mid-19th century, even when South Vietnam had fallen in the hands of French colonialists in the 1870-ies, the *old paradigm* with the article of faith (“They [the West] rely on their wealth, we rely on our virtue. They depend on their strength; we depend on our manpower. They use their skills; we use our loyalty. The skill is superficial, it is just a redundancy”) was kept alive. The reason of the *normal science* was “Unable to change the literary tradition that has existed for thousands of years, the common sense of religion is inviolable”, “*Nội hạ ngoại Di*” [内夏外夷, civilized Central China, barbarians outside], “learn of barbarians”⁶. As a consequence, although it appeared that the *anomalies* and the *crisis* in the Vietnamese society (a number of questions raised when failures in the fight against French colonialism remained irreparable), the *revolution* and the *new paradigm* never took place.

While searching for a theoretical argument, we found many documents in text books of the period of Tự Đức’s reign [Đình Thanh Hiếu 2013: 60—69]. Our explorations show the harmony with the module changing process. During that period, Communal village exams (martial arts) were divided into four events. The third event was gun shooting exam. National exams resembled more or less the inter-provincial exam but were more complicated (according to the 17th Minh Mệnh examination program of 1836) [Nguyễn Tường Phượng 1950: 61].

If regarding the stage since the 11th till the 19th centuries as a historical paradigm, the *post-stage* period of this bureaucratic monarchy recognizes the inheritance and continuation of the model-standard period (since the 16th until the 19th centuries), with similarities and “differences/*anomalies*” compared to the standard framework. Minh Mệnh wanted to follow the Emperor Lê Thánh Tông [黎聖宗] model, but the social context of the 15th century Early Lê Dynasty [初黎朝] was very far from the social model of the Nguyễn Dynasty in the 19th century. For various reasons,

¹ In the report of French missionaries who had been mobilized for the expedition in Vietnam to confirm after the 1847 case, the state no longer built European-style ships [Cao Huy Thuận 2003: 56].

² *Đại Nam thực lục* recorded about the 1847 case, that the French used to go ashore, to the village, to meet the informants for France, they even defiantly robbed the sail and the line of the copper-covered ship in Sơn Trà [ĐNTL 2007-6: 975]. “On September 1st [1858] Đà Nẵng Bay was still covered in morning fog, when suddenly, there were explosions of the first bullets from the French-Spain fleet” [Nguyễn Xuân Thọ 2016: 63]. Some other modern methods were used such as crowd effects (psychology) and so on [Ministry of Science and Technology 2019].

³ It is worth to note Cromer’s confident comparison of Europeans and Asian people: “the intellect of Europeans is like a machine”, while Asian people’s intellect “is like images of the street, in the matrix” [Said 1978: 38].

⁴ Based on the definitions of Thomas S. Kuhn [Kuhn 2008]. About “*paradigm*” see more [Morin 2007].

⁵ To make it clearer, the historical paradigm is a social and historical system structure which is put in a time and space frame existed in reality [Nguyễn Thừa Hỷ 2018].

⁶ To answer the question: “Chinese people invented it in the earliest time. It is also very sophisticated and cannot be passed down because they “hate deceives”; “It’s wrong not to see our sophistication but just to be dazzled by their novelty”.

including the lack of new economic and social dynamics, the post-model period of the Vietnamese monarchy had been prolonged and had become increasingly inadequate in self-reliance convert [Nguyễn Thừa Hỷ 2018]. Continuously exogenous effects from the early 19th century had appeared “anomalies”, indicating “crisis” to a soon manifested paradigm shift, through a transition period since the mid-19th century till the early 20th century.

Some Remarks

According to the above-mentioned scholarship, facing the 19th century changes, Vietnam restored the orthodoxy model of oriental (underdeveloped) feudalism. From the standpoint of the history of science and technology, it is correct to confirm that Vietnam was strongly influenced by Qing China Confucianism, creating the totalitarian state in every respect, holding monopoly in governance activities, including the national scientific system.

Prior to the 19th century, Western Europe had passed the industrial and scientific and technological revolutions which had created a solid base for conquering the world. In the meanwhile, although the Vietnamese traditional society had changed, the continuation seemed to stop at *core*¹ (upper ruling class and elite). Vietnamese scientific and technical system was a transition, but the change was slow, with the draw, between the limited penetration of *periphery* (communal village, lower class and society) into *core* and the tension of the paradigm shift [Nguyễn Mạnh Dũng 2018].

Profited from commercial interests at sea, geostrategic and geopolitical positions [Mahan 1918; Kaplan 2017], the French seapower sent troops into Vietnam owing to tremendous advantages. Though the Vietnamese defeated their allied legionnaire in Đà Nẵng, in the long-term, Vietnam was not able to win a war which in fact was based on a highly risen material civilisation. Indeed, though Tự Đức made reform efforts, the weakness and shortcoming of the cultural, economic and social supports (national realities), the lack of a political doctrine and the fundamentals of science and technique made Vietnam unable to sustain and defend its sovereignty and its territorial integrity.

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**ВЬЕТНАМ В ПЕРВОЙ ПОЛОВИНЕ XIX ВЕКА:
РАЗВИТИЕ НАУКИ И ТЕХНИКИ
И РЕАЛЬНОЕ ПОЛОЖЕНИЕ СТРАНЫ**

Аннотация. Эпохе последней и наиболее долго правившей в Кохинхине вьетнамской династии Нгуенов посвящено большое количество исследований, основанных на различных подходах и новых материалах. Тем не менее с точки зрения развития науки и техники этот период вьетнамской истории оставался неизученным.

Целью статьи является оценка научно-технического развития и реального состояния Вьетнама накануне колониального завоевания в первой половине XIX в. в трех аспектах: а) получение научно-технических знаний; б) состояние национальных военно-морских сил и возможности этого вида вооруженных сил перед лицом мирового прогресса вооружений; в) критическая точка развития вьетнамской науки и техники того времени.

Ключевые слова: Вьетнам, Франция, наука и техника, династия Нгуенов, XIX в.

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