

Research on the Introduction and Dissemination of Western Science and Technology in Westernization Movement

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Abstract

Western science and technology were widely introduced and disseminated in China in late Qing, which caused the modernization of China. Westernization Movement is the first attempt of modernizing China, in which, the introduction and spreading of modern science and technology is an indispensable part.

Keywords

Westernization Movement, science, technology

1. Introduction

The Westernization Movement is the beginning of massive learning of science and technology from western country, which is authorized by government. In the tough experience of negotiating with European powers, especially after going through the painful failure of the second Opium War, some of the advanced personages from the authority, such as Yi Xin, Wen Xiang and Gui Liang, was aware of the fundamental role played by gunboats in national armed resistance to aggression. In addition, in the battle of suppressing the Taiping Heavenly Kingdom, local warlords such as Zeng Guofan, Li Hongzhang, Zuo Zongtang, Zhang Zhidong, were reused for the rescuing of the government. It is precisely these people, in order to eliminate internal and external calamity so as to maintain the feudal rule of the Qing Dynasty, combined a new faction, Westernization Group, and began the the attempt of modernizing China by introducing and spreading Western science and technology.

2. The Introduction of Military Equipment and Technology

After the failure of the first Opium War, Wei Yuan pointed out that foreigners were adept at manufacturing warships, firearms and troop training method. Furthermore, naval warfare will be the primary form of battle. Wei advocated that "barbarians technology to the barbarians", proposed the establishment of China's military industry, especially the shipbuilding industry, which can be furthermore used for the industry of civil products. Feng Guifen pointed out that in addition to military equipment, western mathematics, physics, chemistry etc. are far more sophisticated than China. In his opinion, rather than relying on purchasing boat and hiring craftsmen from outside, we should put some effort in acquiring modern science. He advocated learning western languages, translating Western books. He even proposed to give official career to people who hammering at studying modern knowledge.

Westernization Group focused on military equipment and technology, especially shipbuilding technology. Yi Xin said: "The principle of statecraft is self-improvement. Considering the situation, self-improvement depends on troop training, while troop training relies on equipment manufacturing." [1] From his saying, how to create a new type of military weapon is the primary problem, which must be solved in the production of large modern machine. And once the large machines are produced, they can be used not only for military purposes, but also will benefit people's livelihood, for large machines will expand production, such saving manpower and resources. As Li Hongzhang said: "Western machinery are not only built for producing military equipment, but can be used for farming and weaving to save power." In 1861, Zeng Guofan founded Anqing Ordnance, and invited Xushou & Huahengfang to manufacture steamship. In 1864 Zuo Zongtang tried to make copy

of steamship in Zhejiang, but also turned to be a failure. In 1863, the Qing government bought the ASI fleet as a package from Britain, but nearly fell into Britain's conspiracy of controlling Chinese navy. After all these trying, Westernization Group decided to buy Western machinery&equipment, and then independently manufacture military weapons. In this process, quickly and accurately mastering western manufacturing technology is the Holy Grail.

3. Setting up Schools to Learn Modern Knowledge

In the factory founded by Westernization Group, there were a large number of foreign employee who were in charge of operating the large machine and guiding Chinese apprentices. Especially in the military factory, there were always craftsmen and soldiers working together with foreign technical personnel to observe and learn manufacturing skills. In addition, the Westernization Group also set up schools, in order to train specialized personnel to master certain basic knowledge. Zuo Zongtang pointed out that to develop shipbuilding business, learning the skills of manufacturing and driving is far more important than building one boat. What's more, the skills should be widely spread, rather than learned by one or two. As a result, the Westernization Group's practice of learning from western turned from manufacturing technology to fundamental science knowledge, though the way of founding schools in China and sending students abroad.

In 1866, with the Foochow Dockyard started, shipping school was set up at the same time, which recruit clever boy over 10 years old to learn foreign language, mathematical natural science knowledge, manufacturing related courses and navigation. Yi Xin pointed out that learning the superficial knowledge would not do benefit to practical use, and awarding them some fundamental work need to be done. He advocated to add classes of astronomy and mathematics in the Imperial Translators' College, recruiting students without age limit, and awarding them official career. These are initiative attempts in China to offer science and technology classes in public school. Thereafter, the Westernization Group established more and larger new schools. In addition to military school such as naval academy, torpedo school, others civil industrial technical schools like telegraph school, mineral school, medicine school, business school etc., began to be founded. Besides cultivating new talents at home, Westernization Group sent students to study abroad. The relatively larger scales of sending students abroad happened in 1872 and 1876. The former were sent to America and the latter were sent to Europe. New talents trained by domestic new schools and abroad made great contribution to the modernization of China.

4. The Spreading of Modern Science

Zheng Guanying mentioned in his famous book *Warnings in the Blooming Age* that the knowledge system had rapidly changed, he said: "The old saying says, a person who has overall knowledge about the heaven, the land and the human being is a scholar. And a person who know nothing should be shameful. Today's knowledge about heaven takes astronomy as the key link, and concludes knowledge about algorithms, calendar, electrical, optical and so on. Today's knowledge about land takes geography as the key link, and concludes meteorology, planting, shipbuilding, troop training and so on. Today's knowledge about human being takes language as the key link, and concludes politics, law, manufacturing, business, craft and so on." [2]

By cultural analogy, Zheng Guanying pointed out that western science and technology were not diabolic tricks and wicked craft, but the foundation of their prosperous and strong, which were the basic parts China should learn from them. In addition to running factories, establishing schools, sending students abroad, the Modernization Group officially established the earliest publishing institutions, which were attached to their business our schools, such as the Imperial Translators' College and the Jiangnan Manufacturing Bureau's Translation Center. Jiangnan Manufacturing Bureau's Translation Center served for guns and ships manufacturing business, bringing together Xu Shou, Hua Hengfang and other Chinese most outstanding scientists, engaged n the translation work of the principle of machinery, shipbuilding technology, theory on steam engine and other Western

science and technology. Their work covered comprehensive contents, and the translation quality was of high level.

5. Evaluation of Modernization Group's Attempt on Introducing and Spreading Western Science and Technology

The idea of introducing and spreading western science and technology was raised and practiced by the Modernization Group in face of internal and external problems. At the beginning, this was defined as a self-improvement movement in center of establishing modern military industry and enhancing the military technology, by the attempt of bringing in western advanced machine and learning shipbuilding techniques. For the purpose of raising military expenditure, they put forward the slogan "to be rich", and focused on the development of civil and military related industry, such as railway, telecommunications, mining, shipping and so on. To learn western engineering technology, at first, they hired foreign personnel as both technical personnel and professor to guide Chinese apprentices. Afterwards, they sent up new schools, translated western science books, and sent students abroad to learn the basic theoretical knowledge of modern science. The Westernization Group's cognition on western science and technology can be described like this: direct purchasing finished products from others will be easily contained by others. Hand-making steamship cannot work. So the saving and convenient way is buying large machines from western country and manufacturing weapons all by ourselves. To accomplish this goal, we must learn basic modern science knowledge.

In the Westernization Group's point of view, it is modern science and technology put westerners in the advantageous position. So they set up factories and schools, in order to cultivate talents. As the ruling class of the feudal society, the idea and practice of Westernization Group are prospective, but in the final analysis, their ultimate goal of introducing and spreading modern science and technology is to maintain the decayed feudal system, and what they have learned, is only the small part of modern science. Been defeated in the Sino-Japanese War of 1894-1895 marks the failure of Westernization Movement.

As the first large-scale government behavior of introducing modern science and technology, Westernization Movement is the beginning of the construction of modern China, marking the transition from hand making to large scale manufacturing. They cultivate a batch of new talents who master modern science and technology. Moreover, in their debating with the Diehard, scientific conception is spread, which shocks the traditional ideas. The idea of adding astronomy and mathematics schools in the Imperial Translators' College Peking, and awarding students there official career, is a strike to the Imperial Civil Examination System. As long as this reformation is carried into effect nationwide, it will certainly put forward the spreading of modern science among people. Sadly, this work hasn't been done during Westernization Movement, this task is carried on to the reformers.

References

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- [2] Zheng Guanying: Warnings in the Blooming Age, (Huaxia Press, China, 2002), p.109-110.