

Theme: Industrialization, Urbanization and Triple Helix Model

Title: State Logic and Government's Dominant Role in Formation of Shanghai State Electric Power Industry (1945-1965)

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Abstract: *The Government's dominant role in formation of the Shanghai state electric power in a transition period (1945-1965) for government administration, economic system and ruling party is the focus of this paper, based on "state logic ---- putting national interests above all else". This is also a case study of government-pulled triple helix. When World War II ended in 1945, the American-run Shanghai Electric Power Corporation struggled to maintain electricity production. The Shanghai municipal government decided to form "Shanghai Joint Electric Power Corporation" in 1948, but the project wasn't approved by Kuomintang's central national government. However, the P.R. China Government nationalized the key plants in 1950, starting to establish a state electric power enterprise.*

Keywords: Shanghai electric power industry, State logic, Statist Model (Government-pulled triple helix), State electric power, Shanghai University of Electric Power

Introduction

The triple helix was generated from an analysis of government's relation to university and industry indifferent societies and its various roles in innovation. (Etzkowitz and Ledesdorff, 1995; 2000) Study on university-industry-government triple helix model can date back to the initial exploration on government-industry interaction by Henry Etzkowitz (1984). He highlighted government's critical role in pushing new high-tech industry, revealed American government's key investment in developing nuclear industry after World War II and indicated that the insufficient government's support resulted in solar industry. He argues that the United States decided to develop a nuclear power industry in part to justify the continued development of its nuclear weapons program. One of this decision's results was the repression of solar energy technology.

Nuclear energy became institutionalized as a "big science" in the United States immediately after the Second World War. Government research laboratories, university engineering departments, and divisions of major industrial corporations were committed to developing nuclear energy. Solar energy, meanwhile, remained a "little science." Solar research was limited to researchers at small companies and universities, with only occasional involvement by government and large corporate research laboratories. (Etzkowitz, 1984)

Etzkowitz and Leydesdorff defined a historical situation as a specific model of Triple Helix configurations, in which nation state encompasses academia and industry and directs the relations between them. (Etzkowitz and Leydesdorff, 2000) Even if in the USA's social system with free market economy, government plays indispensable role directly and indirectly in industrial development, in War and

peacetime. (Etzkowitz, 2000) Since socialism state ownership is still dominant in social system of the P.R. China, in which the university and industry are mainly owned and run by the government, a Statist model or government-pulled triple helix is formed for innovation and sustainable development. (Zhou, 2008; 2015)

Inspired by the studies above, this paper explores government's dominant role in Chinese industry development, on the grounds of the research in government-pulled Triple helix (Zhou, 2011) and a doctorate dissertation, "The research on electrical industry in Shanghai 1945-1965" (Gao, 2014), in which the state-of-the-art on development of Electric Power industry in Chinese modernization has been analyzed following a theme of "state electric power".

As an important part of "the Making of Modern China", development of the electrical industry in China has attracted academic attention in the fields of history, politics and economics. It has been shown that the electric power sector as fundamental support of national industrialization interacts with the government administrative apparatus under the leadership of the Communist Party of China (CPC) to achieve industrialization. Since individual units in the electric power industry made dramatic contributions to this development, government's dominant role in electric power higher education is investigated to confirm the government's "pulling effect."

Considering the Chinese electric power industry as a typical instance and looking into its history, this research focuses on three basic issues:

- Government's dominant role in Chinese electrical industrialization: how is the top-down dynamic mechanism driven by the government in Shanghai;
- State logic of the Electric Power industry development: why different, even opposing, administrations, Kuomintang and CPC made similar decisions for nationalizing this industry although varying capital input and resources allocation methods were chosen;
- Generation of China's triple helix model under state logic and government pulling: how are electrical higher education institutions and Electric Power enterprises managed or administrated by the government?

The Chinese electric power industry, with a complex industry capital composition, originated in order to provide the power supply infrastructure for lighting. Government originally didn't have a dominant power position in the electric power industry development. The government-oriented strategy emanated from Kuomintang government's power construction plan in home front during World War II.

A State logic of Electric Power was formed in the postwar and has systemically been implemented

both in Chinese Taiwan and mainland since 1949. Furthermore, under the Communist Party governance, China has developed an educational system within the Electric Power sector and intellectual and technological resources have continuously been put to work in the development of a national electric power system.

Electrical higher education institutions (EHEIs) play a critical role in the industry's growth. The EHEIs' development in China can be divided into three periods: prior period (1950-1966), Culture revolution period (1966-1978) and latest period (since 1978). In all periods, the political power and state logic both affect EHEIs' development. The trajectories of the triple helix interaction such as university-industry linkage, government-industry relationship and government-university relationship are also oriented by political power and state logic.

The domination of government is a key element for a fast-developing country, especially in the field of foundational industries and infrastructure. Electric power is viewed as a national strategic resource and thus the electric power industry is recognized as a state-controlled industry. As the industry and the EHEIs are both owned by the state (government and the CPC), it clearly exemplified a statist model, a government-pulled triple helix.

Literature Review

In the early stage of Chinese electric power industry, power facilities were owned and operated by foreign capital, native merchant, regional community or local government. (Wang, 1997; 2002) The diversity of investment sources led to a frequent circumstance of electric power companies and their plant alternating their ownership between private management and public-owned control that was partially supported by individual investors when there was a shortage of funds.

Before the 1930s, the electric power industry originating in the power supply infrastructure for lighting had gone through its period of privatization. Yingjia Tan described the nationalization of the electric power industry driven by Party-State authority in 1937-1957 as "Revolutionary Undercurrent". (Tan, 2015) Tan's research investigated Chinese electric power industry with different historical scenes including North China in the Sino-Japanese War, Tennessee in the Pacific War and Chiang's Taiwan in 1950s. Tan argued that, under the situation of "War Time", national authority controlling grid construction and price setting were not the actions of Rent-seeking but to get the energy security and electric constancy driven by limited time and resources, although the plan of "State Electric Power" consumed significant

wealth of the nation.

Since the year of 1949, “State Electric Power” in the Chinese Mainland had been driven by measures concerning unifications and mergers in the field of industrial capitals, fixed assets, transmission network and sales management. Within the regional economic plan, Shanghai became a center of electrical system of the East China instead of an isolated urban area between the provinces of Jiangsu and Zhejiang. (Jun, 2008) Jun’s research clarified that “State Electric Power” implemented a synergetic strategy on electrical construction that realized holistic enhancement in an across-province region instead of separate improvements at developed cities. What’s more, before the global electricity reform in the 1990’s, electricity provision in Asian developing countries was an activity dominated by the state. Electricity’s central role in industrialization and modern living standards made electrification an urgent priority of every national government. For majority, regardless of political system, government was seen as the appropriate vehicle for the construction and operation of national electric grids, and the only entity capable of mobilizing the necessary human and financial capital. (James H. Williams and Navroz K. Dubash, 2004)

Methodology

A government-industry-university interaction triple helix is used as a basic framework in this paper, with a focus on top-down government’s role in developing the electric power industry as national strategic resource. Combining historical and logic methods based on the facts and narratives from multiple media data resources such as archive documentations on China electric power industry development, this article analyzes the government-pulling effect on a state strategic industry. Some actual cases and systemic data are used. Moreover, the exploration targets 1945-1965, because it is a period of Chinese state electric power system formation. Since Shanghai is the city that first utilizes electricity in China and became a typical city that can reflect what took place in other cities hereafter, it is chosen as an exemplary case.

Statist Model in China: a Government-pulled Triple Helix

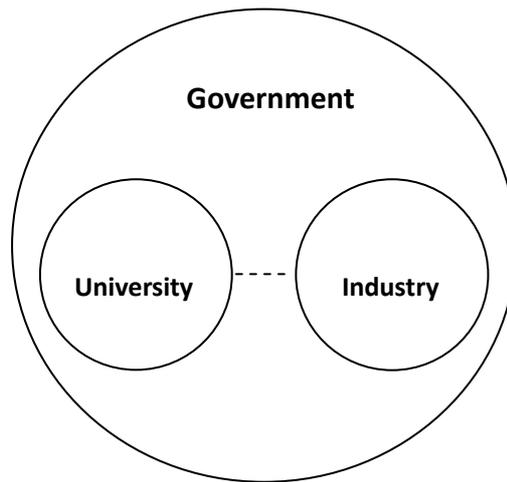


Figure 1 the Statist Model

The path to the triple helix begins from two opposing standpoints: a statist model of government controlling academia and industry (Figure 1) and a laissez faire model, with industry, academia and government separate and apart from each other, interacting only modestly across strong boundaries. From both of these standpoints, there is a movement toward greater independence of university and industry from the state. The interaction among institutional spheres of university, industry and government, playing both their traditional roles and each other's, in various combinations, is a stimulant to organizational creativity. New organizational innovations especially arise from interactions among the three helices. (Etzkowitz, 2008)

In a Statist model, government is the dominant institutional sphere. Industry and the university are subordinate parts of the state. When relationships are organized among the institutional spheres, government plays the coordinating role. In this model, government is expected to take the lead in developing projects and providing the resources for new initiatives. Industry and academia are seen to require strong guidance, if not control. The statist model is characterized by specialized basic and applied research institutes, including sectoral units for particular industries. Universities are largely teaching institutions, distant from industry. The model relies on government to link each other in a top-down way. (Etzkowitz, 2008)

State Logic: From Propaganda and White Book to Socialism Transformation

A Statist Model caused by dominant state-ownership, hierarchy administration and co-ordinate resources arrangements characterizes as government's "pulling" role, rather than "pushing", in a technology

following society. In this study, State is considered as a concept that consists of four elements: relatively stable land size, relatively stable population, and relatively stable political and economic system(s); the culture and history. a state is defined as sum of politics, economy and culture formed a group of people in a piece of land, including its history. According to "*Modern Chinese Dictionary*" (2012), Government is political institution that is defined as "authority of a state" and responsible for the administration; and Party is a political organization that represents a social group to achieve its benefit per se.

"State logic" has three cornerstones:

- a. All wealth belongs to the state, —>state-ownership.
- b. Put the national interest above all else, —> Government becomes the highest authority.
- c. The Party and the State are one, and the Party represents the State, —>the supreme leadership of the ruling party.

"State Logic" mentioned here respects the reality that government administrates significant economic sectors with foundational strategic resources, e.g., energy, transportation and communication. It is necessary to understand State Logic through historical backtracking, in which plan designers or policy makers are viewed as specifically political authorities. The Party and government take the lead and have pivotal impact on the evolution of the country.

Chinese modernization and industrialization was launched through Westernization Movement (1861-1895) and New Policy in late Qing Dynasty. Ideology of modern nation was first clarified in the form of authority by Sun Yat-sen in *The International Development of China* (《建国方略》) published in both Chinese and English in the 1920s. In the book, Sun as one of the most founders of this modern nation described a dual pattern of industrial economy as follows:

Development of Chinese industry should depend on private proprietorship and national operation both. The business accessible or more appropriate to individuals than state ownership is supposed to open to private economy. By national awards and legislative protection we shall pursue to realize the prosperity of personal enterprises. (Sun Yat-sen, 1928)

Sun had a big blueprint for the modern country based on his *Three Principles of the People* (三民主义), i.e., "Nationalism" (民族主义) and "Democracy" (民权主义) and "People's Livelihood" (民生主义), which was never realized in his time. The quotation above seemed a description of an open space for private economy whose future would be actually delineated under an institutional and executive atmosphere. According to the Principle of People's Livelihood, government of modern China should

cultivate state capital instead of private economic composition; the development of the latter would be governed by the policies of restriction. In the following decade after 1920s, multiple sources of capitals poured into the industries and pushed them prominently. This was called “Golden Ten Years” of Chinese economy before the World War II.

The year of 1937 was a very critical point in the modernization history because then government reviewed economic achievement and drafted modernization construction of China, while Japanese military power increasingly invaded the land. Considering electric power industry growth as national strategy, Kuomintang Government denoted its reliance to both public-owned and privates without any division of province and city in order to keep domestic balance between supplies and demands, and the State wouldn't remove private ownership but rather expect economy improved through the private sector.¹ Moreover, central government asserted to take shape of administrative control gradually to drive electric power industry without any interference with private enterprises.

National Economic Plan Committee of Kuomintang Central Department (国民党中央党部国民经济计划委员会) restated national strategy for developing electric power industry and proposed that “massive power plants should be operated under public ownership, and electric power distribution and sales are relatively accessible to local communities or firms to manage”.² The reality of the nation showed that domestic private electric power industry was indeed on a huge scale with more than 92% share of individuals in total Electric Power facilities and more than 72% in total generating capacities. Therefore, government decided to modify private business by supervision and prohibition in case of abuses of credits from the public and, on positive side, by communication and cooperation to regulate its development. On the other hand, government aimed to push small Electric Power plants to combine with each other or to turn to operations for transmission and distribution.

The Sino-Japanese War interrupted the regular progress of China's modernization, while republican government launched electrical construction at rear area to support war defense and military industries mainly. After the strategic retreat to Chungking, Kuomintang Government in the Mid-west China had invested and built the massive electric power infrastructure. At the end of the War, the nationalization of China's power grid became, aiming at state reconstruction, a postwar continuation of wartime energy

1 Jianshe weiyuanhui quanguo dianqishiye zhidao weiyuanhui 建设委员会全国电气事业指导委员会 [Electric Utility Regulation Board of The National Construction Commission], “*Zhongguo dianli*” 中国电力 [*Electrical China*], Vol1, No.1, (1937), 1.

2 Guomindang zhongyang dangbu guominjingjijihua weiyuanhui 国民党中央党部国民经济计划委员会 [National Economic Plan Commission of KMT Central Department], “*Shinianlai zhi zhongguo jingji jianshe yijiuersi zhi yijiusanqi*” 十年来之中国经济建设 1927-1937 [*Chinese Economic Construction in the Last Decade 1927-1937*] (Nanjing fulun ribaoshe, 1937), Chapter 6, 6.

policies (Tan, 2014). New President Chiang Kai-shek reaffirmed guidelines on industrialization in China by retrospection about what Father of the Nation (Sun Yat-sen) said as following.

Mr. President Sun said: "The tendency of modern economics is to substitute economic concentration for free competition." His plan for dealing with this situation was: "In China, two revolutions must be launched simultaneously: the replacement of hand labor by machinery, and unification under government-ownership." Only if this policy is adopted can Chinese industry hope to achieve unimpeded progress. (Chiang, 1947)

Chiang deemed that politics was affected and even controlled by economics in capitalist countries. If China desired to replace a hundred-year-old, restricted, unbalanced, semi colonial economy with a free and independent economy that will satisfy the requirements of national defense, the state must employ political power to guide economic development. Since the late Qing Dynasty, China has been subjected to the bondage of so many unequal treaties that she can't compete with the advanced industrial nations and must therefore adopt a protectionist policy with regard to foreign trade, and a policy of economic planning with respect to her industrial development.

Under economic circumstance above, ruling Party of People Republic of China considered that private capital alone wouldn't be sufficient to operate on a large scale, or to compete with the trusts and government-operated enterprises of foreign nations, which was the great weakness of laissez-faire economic theory and why it was unsuitable for China. But financial shortage and political struggle stalled the implementation of national reconstruction plan (or White Book) drafted by Chiang and Kuomintang, in the field of key industrial sectors, to direct the next two decades development of Taiwan. Meanwhile, Red China's economic construction in Mainland was steered by the waves of Socialistic Transformation, Chinese Communist Party government, under different political faith and diplomatic situation from Taiwan, also adopted State Logic, a similar strategy to predecessor, to push the industrialization in Chinese Mainland after 1949.

For Chinese modern industries in early time, private economy surviving among domestic oligarchs relative to old empire and overseas capitalists landing with warship and technology has never played the role of foundation which needed a powerful leadership to build. Government constituted by political leaders and intellectual elites was the most suitable choice to lead the industrialization and make the strategic decisions about it. Since 1920s, there was an evolution about State Logic happening continually with political climate changed. At the very beginning, founders of the modern China judged private capital

and business as important as state properties. Chiang's government started to integrate private ownerships that can't support themselves by interference of state capital, especially in the field of public utilities, which was led to an extremity by national war defense in 1940s. Postwar policies about national reconstruction was the continuation of wartime's, and the tendency of state operation extended from public services and facilities to basic industries, such as national post, metallurgy, military project, artery of railway transportation and large-scale hydropower station.

Under the leadership of CPC, economic system based on socialistic state ownership was built quickly by the movement of Socialistic Transformation in the 1950s, and government's decisions on economic development and industrial system establishment was carried on in top-down way by interconnected national economic plans with five-year expiration for each. By the first half of 20th century, the government-pulled model in China had been set up gradually by several generations of political leaderships. How Chinese government realized the state logic in electric power industry will be expounded in the following sections.

State Electric Power: from Rejected Project of Shanghai Joint Electric Power Corporation to Formation of the National Electric Power System

State Electric Power has two relevant implications: (a). all the electric power resources are state-owned; (b). the electric power industry development pattern is depending on the powerful authority of the state. It's to say that, concerning history and reality, the will of state performed by government's authority has dominated the electric power industry and various resources adherent to it by legislation, administration or entrepreneurial management under state-ownership. In this case, the government's decision on electric power development involved more economic calculations and less political factors that were very significant to this sector in early period. In order to discuss the industrialization in modern China, let's start from a project of "*Shanghai United Power Company*"(上海联合电力公司) in 1946-1948.

As mentioned above, Chiang's government wasn't able to achieved success on postwar electric power industry reconstruction in Mainland and created Taiwan's electricity model instead, which could become a general consensus about Kuomintang government's ruling experience on national economy but made witnesses ignorant about the ambition and determination of the leadership of a great independent country after World War II. The case of "*Shanghai United Power Company*" will show us that how Chiang's and Mao's government carried out their plans about postwar electrical reconstruction.

In 1929, American Far Eastern Bond and Share Company controlled by Rockefeller Group purchased the riverside power station from Municipal Council of Concession in Shanghai and established Shanghai Electric Power Company that became the biggest electric power business in prewar East Asia. In 1945, electric power system of Shanghai fought against the shortage of electricity with American-run Shanghai Electric Power Company as a mainstay. Meanwhile, a Proposal on Shanghai United Power Company, with American-run Shanghai Electric Power Company as a leader and several native companies as partners, had jointly worked out by Shanghai government and American-run Shanghai Electric Power Company, during the negotiation on solution of electrical shortage between Shanghai and central government. However, Kuomintang central government rejected the Proposal because of the worry that the delegating contract between the government and the company would open a chance of monopoly on electrical industry to foreign capitalists.

The incident of “Shanghai United Power Company” also displayed an interactive mechanism between central administration and local governance on industrial development, which can be interpreted as a postwar intensification of government’s antebellum strategy that *National Steering Committee of Electric Enterprise* (全国电气事业指导委员会) instituted under *Construction Committee of National Government* (国民政府建设委员会) in 1928, by strict rules and regulations, supervised public electric power enterprise and consolidated electrical companies that were already on certain scale and quantity. To the contrary, the electric power firms operated by foreign capitals were exceptions to regular administrative system of national government. They had always taken advantages technically and financially in the competition with native electric power companies.

Accompanied with foreign settlements abolished in Shanghai postwar, American-run Shanghai Electric Power Company, a real designer and proposer of the “Shanghai United Power Company” supported by the urban administration, was a product of government’s compromise that Chinese government had to allow the existence of foreign ownership on public utilities in pre-concession area after expropriated by Japanese during the war because it was realized that Shanghai couldn’t solve the shortage of urban electrical supply without support from American capital.³ On the other hand, *Central Resources Committee* (中央资源委员会) instituted *Preparatory Office of Jiangnan Electric Power Bureau* (江南电力局筹备处) in order to remedy electricity supply of Shanghai and expedite power grid construction in the

³ “waijiaobu guanyu shanghai lianhe dianli gongsi ti’an de yijian” 外交部关于“上海联合电力公司”提案的意见 (Comments on the Proposal of “Shanghai United Power Company” from Ministry of Foreign Affairs), 1947, Record Number: Q5-3-5468, Shanghai Municipal Archive, Shanghai.

area of *Taihu Lake Basin* (太湖流域).⁴ This constructive plan would build *Longhuazui Power Station* (龙华嘴发电厂) along eastern bank of Huangpu River, which was an open chance, declared by Central Resources Committee, for all private power enterprises in Shanghai to subscribe its shares.

However, besides land occupancy and infrastructure, there was a dilemma that what the new power station needed most is an electric generator unit that had to depend on war indemnity from Japan whose machines were old and out of repair, which was obviously unhelpful for the plan of Jiangnan Electric Power Bureau. According to *Regulative Items for Public Utilities Operated by Private Enterprise* (《民营公用事业监督条例》), foreign capitals were prohibited to run or join the operation of public utilities except allowed by central government. KMT government accepted the fact, instead of persisting in the regulations, to find a solution to Shanghai's power shortage in economic reconstruction. But it didn't mean that foreign company and capitalists can break the baseline of restriction to them to monopolize electrical business in Shanghai even though Chinese government didn't have enough financial resources to put into postbellum reconstruction. Chiang's government instead made loans from the White House rather than allowing American capitalists to pour into the Chinese market after 1945, which was an alternative strategy to keep the control of indigenous industries and to direct native economy by State Logic for a new independent country under the Yalta System.

What needs to be explained here is that the discussion about reconstruction and industrialization of China after the World War II should knock down the wall of politics between Chinese Nationalist Party (KMT) and CPC because both governments emphasized the importance of state-ownership in the system of national economy and the domination of government's decisions and policies. (Gao, 2014) The construction of "State Electric Power" was completed by "Red China", through the Socialistic Transformation in 1952-1956.

In history textbook, "*Joint State-Private Partnership*(公私合营)" was a socialistic movement, with economic and political significances both, happened in the field of agriculture, industry and handicraft in 1953-1956. Actually, this procedure was initiated at the very beginning of CPC's taking over the economy of Chinese Mainland, especially for industrial estates. After 1949, central government of CPC seriously focused on the situation of Shanghai that had been a greatest city of Chinese private economy in the period

⁴ "Shanghaishi canyihui yaoqiu ziwuhui jiang fadianji zhuanhou bing jiang lianhe dianli gongsi ji jieshou dianji juti banfa bingzhanhe de han" 上海市参议会要求资委会将发电机转售并将联合电力公司及接收电机具体办法并转核的函 (The Letter of City Council Asking Central Resources Commission for Electric Generator traded to Shanghai United Power Company and Checking the Reception of Facilities), 1947, Record Number: Q1-14-456, Shanghai Municipal Archive, Shanghai.

of Republican China and was, therefore, a most supportive spot for socialistic construction in Red China. The Riverside Power Station was restricted by *People's Liberation Army*(人民解放军) as soon as they came into urban area. Then, *Shanghai Military Control Commission*(上海军事管制委员会), the processor of *People's Government of Shanghai*(上海人民政府), cut off all connections between the power station and its supervised company in America under diplomatic tendency that the relationship of United States and Red China became frozen.

Where the Socialistic Transformation started in electric power industry of Shanghai was keeping the biggest electric plant in charge of CPC's government. As a result of political belief preaching towards communities of the working class, *Public Utility Bureau of Shanghai* (上海市公用局) helped private electric power firms recover electrical production and control coal consumption by calling supports of adept technicians from old regime. For instance, *Zhabei Water and Power Company* (闸北水电公司), the biggest private electric power enterprise in Shanghai, whose average electric transmission line loss rate was about 20% that even reached 30% at most in 1930s prewar, had dropped the figure to 8% by 1952.⁵ However, municipal governor did think that recovery of urban electric system and its further growing were stuck by private-ownership of electric business existing. Actually, the voice from top community, in 1951, indicated that Shanghai which owned the greatest industrial basis and technical advantage in China was not state's choice to invest for industrial construction, thus the local governor should utilize private resources as more as possible to reorganize the electric power system of Shanghai.⁶ That generated a strategic motivation that Shanghai, the biggest city based on private economy in China, had to experience negotiations started by CPC government with the aim of gradual transforming private ownership to socialistic state ownership by a transitive manner of Joint State-Private Partnership in electric power industry.

The transformation was a nationalization of private productive assets as well as a remolding towards people's political belief and self-cognition on labourer role. Initially, the proposals that state capitals would join private enterprise were mentioned discreetly in case of radical tendency of nationalization. Following declarations about Socialistic Transformation in public and meetings with capitalists in private, private

5 “zhonggong shanghai shi gongyongju fandangzu guanyu zhabeishuidiangongsi xingzhi de diaocha yanjiu ji muqian ying caiqu shenme taidu de baogao” 中共上海市公用局分党组关于闸北水电公司性质调查研究及目前应采取什么态度的报告 (The report about Shanghai Public Utility Bureau sub-party group's investigation and attitude on capital essential of Zhabei Water and Power Company), 23th November 1951, Record Number: B169-1-32, Shanghai Municipal Archive, Shanghai.

6 “yijiuwuyi nian qi yue shisi ri li fuzhuren guanyu shanghai dianli gongzuo jige wenti de zhishi jilu” 1951年7月14日李副主任关于上海电力工作几个问题的指示记录 (The record about vice director Li's indication on Shanghai electricity on 14th July of 1951), 1951, Record Number: A38-2-277, Shanghai Municipal Archive, Shanghai.

electric power companies successively applied for Joint State-Private Partnership in spite of their diverse intentions such as to ease financial shortage or to bleach historical stains. But there were an exception that *Huashang Power Company*(*华商电力公司*) decided to stay silent at first. Its meeting of board of directors witnessed a fierce struggle on private right and benefit under Joint State-Private Partnership and confidence on stability of political situation.

The importance of electric power system to urban society and industrial production drove CPC government to lead the Joint State-Private Partnership that mainly went through liquidation and reevaluation on private properties, negotiation on shareholding ratio of state ownership and interest rate of private ownership. As the capital-combined structure established gradually in electric power industry, electric power bureau grabbed practical control right of electric power system in Shanghai because, according to contracts offered by state partners, private partners wouldn't keep the status of decision makers and users of land, building, vehicle and facilities but to gain the fixed interest or rental only.

After early intervention that government had coordinated all private power companies to unify different electric prices based on dissimilarity of operation cost and profit setting by founding compensation funds pool in 1950, administrative authority took over electric power resources from private enterprises to build a integrated electric system by state logic that efficiency of national construction had to cost benefits of private economy, which not only laid the foundation for industrialization but also showed dynamic mechanism of formation of socialistic state-owned industries .

Government Ruling and Evolution of Shanghai University of Electric Power⁷

The University originated *Shanghai Electrical School* (*上海电业学校*, 1951.10—1952.10). According to intention of the *National Electric Power Industry Conference* (*全国电力会议*), i.e., “Adapt to electrical industry development, train carders for it”, then *Ministry of Fuel Industry* (*中央燃料工业部*) instructed Shanghai Electric Power Corporation to prepare to construct Shanghai Electrical School, in early 1951. On Aug.25, Shanghai Municipal Government decided moving 320 students to the School from Shanghai Municipal Construction Engineering cadres training class and Shanghai middle school engineering class. Shanghai Electric Power Corporation chose more than twenty managers, faculties and staff for the newborn school. Most of them had industrial experiences, for example, one of the first faculties, Prof. Lianfu Pan, used to be vice director and Chief Engineer of Yangshupu Power Plant. This ensured the School's tradition:

⁷ Data in this section draws from the official website of Shanghai University of Electric Power. on June 10, 2015.

actively combining teaching and industrial practice. From time to time the students were brought to the power plant construction sites.

In June 1952, in order to learn educational experiences from the former Soviet Union, *East-China Industry Ministry* (华东工业部) decided to establish a secondary electric power industrial school on the ground of Shanghai Electrical School. *East-China Region Colleges Adjustment Committee* (华东区院系调整委员会) merged Shanghai Municipal Industrial School to Shanghai Electrical School, forming new *Shanghai School of Electric Power Industry* (上海电力工业学校 1952.10—1953.10). It is limited to enroll children of the employees who are working for Shanghai electric power industry and municipal workers in post, led by Eastern-China Industry Ministry, with three years of schooling.

The school duplicated the former Soviet Union in teaching, at the beginning. In November 1953, it became led by the *Ministry of Fuel Industry* and renamed as *Shanghai Power School* (上海动力学校, 1953.10 — 1959.8). It affiliated to the *Ministry of Electric Power* (电力部) in 1955.09-1958.02 and *Ministry of Water Resources and Electric Power* (水利电力部) in 1958.02-1959.08. And the School was renamed as *Shanghai College of Electric Power*, still belonged to the *Ministry of Water Resources and Electric Power*. In May and July 1960, for expanding the School size, *East-China Electric Power Authority* (华东电管局) merged the School with Shanghai Amateur Power Engineering College and part-time Shanghai Electric Power Industrial College established, creating *Shanghai Technical College of Electric Power Industry* (上海电力工业专科学校, 1960.8—1985.1).

During the Cultural Revolution (1966-1976), the College was at a standstill. Since 1977, it has been a new development stage. In 1979, *Ministry of Water Resources and Electric Power* (水利电力部) made decision to lead the College together with Shanghai Municipal Government. They jointly worked for Shanghai higher education development in electric power. In such a dual leadership, the Ministry plays main roles in administration, which is good for upgrading the School. It was upgraded as *Shanghai University of Electric Power* (上海电力学院, 1985.1--). Li Peng, the Vice Premier and Minister of *National Education Commission* (国家教育委员会), wrote the name board for the School. Referring to the leadership, Ministry of Electric Power decided to jointly administrate Shanghai University of Electric Power with *East-China Electric Power Group* (华东电力集团); And the latter dominated from 1995. Nowadays, the Central Government and Shanghai Municipal Government jointly construct the University; however, Shanghai Municipal works as the major administrator, rather than the Central. It has missions to serve for regional/ local development. Its Science Park, a collaborative project between the University and

Yangpu District of Shanghai City, has been approved as one of the “National University Science Parks”. Based on the tradition serving for the industrial improvement, the University is on its way to a Chinese-style entrepreneurial mode. (Zhou and Peng, 2008; Etzkowitz and Zhou, 2008; Zhou, 2014)

Conclusions and Policy implications

The electric power industry development is strongly affected by political power and follows a state logic, which views electric power as critical national resource that needs state management and control, forming “State Electric Power”. The policies and decisions by the government push electric power industry going forward, which is an epitome for the process of industrialization. The plans launched by the government have markedly accelerated the industrialization process, upon the national strategy of foundational industry development.

Three factors, i.e., the State (represented by the Party and Government) administration, the state logic of electric power industrial development as well as EHEIs, work together as independent and internal-connective system, constituting dynamic mechanism the triple helix to develop in the electric power industry. Reviewing Shanghai electric power industry development, we can find the advantages of a Statist triple helix; that is, strong pulling force from the government. This study will provide experiences for policymaking of other developing countries. It also brings up thinking: whether state logic is necessary in the industry improvement; whether strong political power is an advantage in the development.

Statist model emphasizes the coordinating role of government. Strong and weak roles for government and industry are the defining characteristic of statist regimes. Change in statist societies is impelled by need to speed up the innovation system by introducing new sources of initiative. Bureaucratic coordination concentrates initiative at the top and tends to suppress ideas that arise from below.

An overlapping triple helix introduces a dynamic element by having three spheres interacting through indirect relations going from one sphere through another as well as through direct relations. This can be seen as an American-style indirect industrial policy, an action on the part of government to influence and improve the level of industry by going through the universities to reach industry. Going through one sphere to reach another is a first step toward moving the institutional spheres closer by a change in government policy. (Etzkowitz, 2008)

University and industry in China, as triple helix actors, are pulled or controlled by government. Present problem with this model is that government does not have an innovation mission directly nor a

limit on ownership of the enterprises that it creates. (Etzkowitz et al., 2007) As the ownership changes and the reform gets deeper, a transition to overlapping triple helix (Figure 2) is being expected. How can the science / innovation policy assist the evolution to an interactive triple helix, how can an overdoing towards a laissez faire model be avoided, and what is government's optimal role and contribution to innovation and development? These will be important topics in the future.

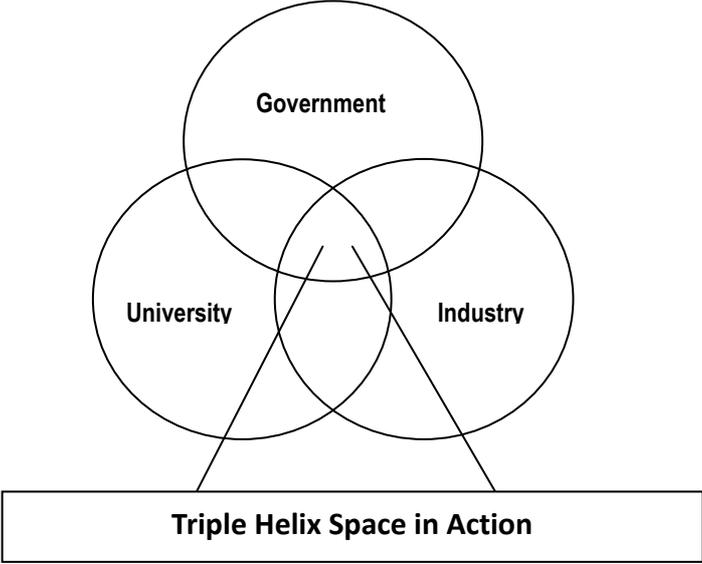


Figure 2 Interactive Triple Helix

Future investigation will focus on whether State logic needs to be abandoned in some “national strategy fields”; and whether the private sectors should be developed to share the state strategic resources. Put differently, should a public-private pathway be taken in these fields? In addition, as China's triple helix evolves into an ideal model, what changes will happen to the industry and university spheres?

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