

**FOR BETTER SILK:
SERICULTURE REFORM IN SICHUAN, 1901 – 1945**

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SUMMARY

This work examines the involvement of various groups and individuals in the technological development of sericulture in Sichuan between 1901 and 1945. Sericulture in modern Sichuan presents a unique case for the study of technological development in an underdeveloped region. As an agrarian-based industry, sericulture allows for observations on both agricultural and industrial development to be made. The modernization of sericulture in Sichuan proceeded slowly, which makes possible the scrutiny of both indigenous technology that remained in use and foreign-originated modern innovations. Central to this analysis are the roles of a variety of groups and individuals who cooperated and competed among themselves in the control and dissemination of sericulture knowledge and techniques in Sichuan during this half century.

This work argues that sericulture technological development evolved from multifaceted paths into a single trajectory of the modernization of sericulture controlled by the government and their professional sericulturists. In the beginning, there was no single-minded commitment towards the adoption of foreign technologies. Different groups and individuals hailing from different socioeconomic, political, and ideological backgrounds took divergent strategies towards the technological development of sericulture. It was only in the 1930s that the provincial authorities and the Nationalist government took over the leadership of the reforms and emphasized on a centralized modernization program.

In examining the technological development of modern Sichuan sericulture, this work addresses two topics related to technology. First, it suggests that technological development was both disruptive and incremental during the early period when the pre-modern regions were exposed to modernizing forces. The foreign technology introduced was creative and revolutionary while indigenous one was more suitable to Sichuan's socioeconomic conditions and developed concomitantly. Second, it reveals that technological development did not simply cause the deskilling of rural producers by rendering their traditional skills and techniques obsolete, but also required them to be re-skilled in the new forms of knowledge and techniques.

The work is arranged chronologically. Chapter 1 presents the historical, geographical, and socio-economic contexts of Sichuan. Chapter 2 studies the interwoven relationship between rural sericulture and peasant economy. Chapters 3 and 4 concentrate on the last decade of the Qing dynasty. Despite their different approaches, the Imperial Court, the provincial government, and the local elites collaborated in the pursuit of sericulture reform. Chapters 5 and 6 deal with the technological situation in the 1910s and 1920s, when civil wars were rampant but silk production was also prosperous. Chapter 5 measures the impact on sericulture of taxation imposed by the military authorities, various reforms carried out in individual counties, and the introduction of Japanese style factories. Chapter 6 explains why there was a wide range of technological levels within the silk reeling industry. Chapter 7 reveals how the provincial government took over the leadership from the local elites, after the world economic depression in the 1930s, and aimed at

modernizing sericulture. Chapter 8 focuses on the involvement of the Nationalist government in the technological development of sericulture during the Second Sino-Japanese War, and the resultant impact. Specifically, it examines an unusual case of economic cooperation in southern Sichuan that involved the Chinese Communist Party, reformist intellectuals, and the Nationalist government. Last, the epilogue briefly introduces the sericulture reforms of the Communist government after 1949, and shows that these reforms have continued the trends that took shape before 1949.

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MEASURES

Money: 1 tael = 1.50 Chinese dollars (\$/*yuan*)

1 tael = 1000 copper cashes (*wen*)

Weight: 1 picul (*dan*) = 100 catties (*jin*) = 60 kg

1 catty = 16 *liang*

INTRODUCTION

This work studies the participation of various groups, from different socioeconomic, political, and ideological backgrounds, in technological diffusion within the sericulture industry in modern Sichuan province, in the first half of the twentieth century. These different groups offered and pursued a diverse range of ideas and approaches towards the technological development of the sericulture industry in Sichuan between 1901 and 1945. This pluralism eventually evolved into a single trajectory of preference for Western technology, which became the foundation and model for the transformation of the industry after the founding of the People's Republic of China.

Sericulture is an agrarian-industry. It involves both an agricultural stage of growing mulberry trees and raising silkworms for cocoons, and a non-agricultural stage of producing raw silk (*shengsi*) through cocoons. The ordinary raw silk is made from the fiber produced by domesticated silkworm, *Bombyx mori*, which includes a wide range of breeds. Mulberry leaves are the only staple food of domesticated silkworms nowadays, but there were also some other supplementary food supply for silkworms during the period under study in this dissertation. Mulberry cultivation and silkworm rearing are primarily carried out by the rural households. For reeling silk, cocoons built by silkworms are boiled in hot water to remove the sericin that gums the fiber together. Threads of several cocoons are then combined together to be reeled off as raw silk, the raw materials of shiny luxurious silk fabric. The stage of

reeling silk is not related to agrarian farming and could be detached from rural economic activity. Sericulture, hence, allows for observations on both agricultural and industrial development to be made.

China was the earliest country to discover the secret of silk production. Its techniques did not spread to Korea until the second century B.C. And people in Japan mastered sericulture techniques in the third century. Silkworms, and the related techniques of rearing and cultivating them, were only successfully introduced into Byzantium as late as in the sixth century.¹ In the following centuries, China continued to be the largest supplier of the best silk goods. Myriad traders had to travel on the overland and maritime silk roads to seek this luxurious Chinese fabric.

However, in the mid-nineteenth century, the primacy of Chinese sericulture diminished and China had to become an importer of sericulture technology. Set up in Shanghai in 1861, the Ewo Filature of Jardine, Matheson & Co. was first mechanized raw silk producing factory in China, as well as one of her first modern establishments.² Although it was closed down in 1870, it began the process of modeling Chinese raw silk production on foreign techniques. There were 10 filatures in 1894 in Shanghai and 29 in 1898.³ By the turn of the twentieth century, filature

¹ Dieter Kuhn, "Textile Technology: Spinning and Reeling", in *Science and Civilisation in China*, ed. Joseph Needham, volume 5, Part IX (Cambridge: Cambridge University Press, 1988), pp. 418-419.

² Shannon R. Brown, "The Ewo Filature: A Study in the Transfer of Technology to China in 19th Century", *Technology and Culture* 20, 3 (July 1979), pp. 552, 567.

³ Tomoko Shiroyama, *China during the Great Depression, Market, State, and the World Economy, 1929 – 1937* (Cambridge and London: Harvard University Asia Center, Distributed by Harvard University Press, 2008), p. 54.

raw silk was the major type of exported raw silk in China. The agricultural sector of sericulture started absorbing foreign knowledge at the closing years of the century. Jiang Shengjin was the first Chinese to study sericulture overseas. He went to France to study modern techniques of rearing silkworm and examining silkworm eggs in 1892.⁴ Later, more and more Chinese went overseas, especially to Japan, to study sericulture in the early twentieth century. After returned, many of them joined in modern Chinese sericultural institutes to spread foreign knowledge and to train more specialists. The new knowledge they learned and spread was based on scientific principles that aimed at give rigorous, testable, unbiased explanation to the nature of sericulture. Both this new knowledge and mechanized production of silk were of foreign origin that was different from the indigenous Chinese ones. Despite their foreign origin, their spread and further development did not always depend on direct foreign involvement. In this work, I sometimes refer to the foreign-originated knowledge and technology as modern knowledge and technology.

In the process of absorbing foreign sericulture in China, Sichuan was a late comer. It did not get the access to foreign sericulture knowledge and technology until the beginning of the twentieth century. Moreover, it was slower in adopting foreign knowledge and technology than was the case in the coastal China. By 1949, sericulture in Sichuan was still dominated by domestic-bred silkworm varieties called native silkworm (*tuzhong*) and non-mechanized reeling technologies. What was the

⁴ Li Pingsheng, "Lun wanqing cansiye gailiang" (Discussion on sericultural reform in the late Qing), *Wenshizhe* 3 (1994), p. 91.

pattern of sericulture transformation in Sichuan? Why was foreign sericulture technology diffused into Sichuan so slowly?

To answer these questions, this work concentrates on the role of human participants in technological diffusion. Technological diffusion is about the acquisition, adoption, and incorporation of innovational technology and skills into production. It requires four critical elements, the innovations such as ideas, practices, and objects, the innovators who invent or introduce the innovations, the receivers who receive and adopt the innovations following innovators, and the communication channels in which innovations spread from innovators to receivers.⁵ Although the study of technological diffusion can only focus on technological elements, after all, it is human agents who apply, implement and adjust the innovations. Instead of focusing on the set of production techniques and knowledge available at that time, therefore, this study examines the interaction of people that affected and influenced the acquisition, adoption and incorporation of sericulture innovations in the socioeconomic contexts and circumstances particular to Sichuan.

Unearthing the pattern of sericulture technological diffusion in Sichuan, and the underpinning factors, provide a case study in the modern experience of the agrarian-based handicraft industry.

Chapters 1 and 2 set out the historical processes and geographical contexts that

⁵ Everett M. Rogers with F. Floyd Shoemaker, *Communication of Innovations: A Cross-Cultural Approach* (New York: Free Press, 1971), pp. 18-40, 174-196.

underpinned the socio-economic transformation of Sichuan society alongside the growth of its sericulture. From a vastly under-populated land at the beginning of the seventeenth century, Sichuan became increasingly overpopulated from the eighteenth century onwards, and a highly stratified rural society gradually took shape. Natural advantages and agricultural commercialization stimulated sericulture in the Basin of Sichuan, especially in the hilly regions. Peasants too possessed all the traditional skills required for producing raw silk, where the whole process of sericulture production could be finished within a single rural household. Their techniques contributed to the subsidiary status of sericulture in rural economy. And the subsidiary nature of sericulture production, in turn, restricted the improvement of sericulture techniques in countryside.

The benefits of improving technology and techniques of both agricultural and industrial stages of sericulture surfaced at the beginning of the twentieth century. Chapter 3 documents the governmental efforts towards encouraging sericulture technological diffusion during the New Policy (*Xinzheng*) reforms in the closing years of the Manchu regime. The central court legalized the equal status of agriculture, industry, and commerce. It encouraged technological improvement by modeling after the West and Japan. Although it did not specially stress the adoption of foreign technology, the loyal and powerful provincial government enthusiastically promoted sericulture education, enacted supportive and protective economic policies, and developed infrastructure for the improvement of sericulture at the local level.

Chapter 4 profiled the leading local figures in the first wave of technological diffusion. These local Confucian gentry conservatively sought to maintain traditional values even as they were open-minded about accepting foreign knowledge. They advocated both indigenous and foreign technologies, as long as they were suitable for the development of local sericulture. For these local leaders, promoting the diffusion of sericulture technology was primarily for the immediate benefit of the local populace and the province, rather than China as a whole.

However, the province-wide reform efforts were soon terminated with the collapse of the Manchu regime in the 1911 revolution. Sichuan was politically separated from the control of the central government soon after the founding of the Republic of China, and was not reintegrated into the Chinese national politics by Jiang Jieshi until 1935. In the interim, the province was afflicted by rampant wars among various warlords. Chapter 5 measures the impact several major actors had on technological diffusion during the era of warlordism, especially between 1912 and 1931. The military authorities had no interest in local developments beyond the extraction of taxes, but taxation did not significantly obstruct sericulture. The local semi-official elites were the leading force of technological diffusion, but had no ability to carry out large-scale or efficient improvements. During this phase, Japanese factories brought the most significant technological innovation. In fact, unlike the usual assumption that warlordism had impeded the economy, sericulture remained prosperous in warlord controlled Sichuan.

Underpinning the prosperity of the raw silk industry was a variety of silk reeling technologies that ranged from the most primitive devices to the latest Japanese mechanized factory, with the non-mechanized techniques in predominance. Chapter 6 explores the explanation for the stagnation in adopting mechanization in silk reeling. I argue that the process of technological adoption was largely determined by cost-benefit calculations. The non-mechanized workshops were advantageous to filatures because of lower cocoon cost, wage cost, and higher productivity. They profited well if market conditions were favorable. The filatures allowed the businesses to realize economies of scale and to standardize product quality, but required heavy investment and consequently large interest burdens. Other lucrative businesses such as speculation and land investment further prevented the native investors from investing in industry.

The prosperity of Sichuan sericulture ended in the 1930s, due to the serious damage wrought by the world economic depression. Under these circumstances, the first systematic endeavor to modernize sericulture took place in Sichuan. Chapter 7 demonstrates this transformation. Both the private and public sectors started investigating the problems of sericulture. They began to see Chinese indigenous techniques and technologies as backward and proposed to replace them with foreign ones. Foreign and indigenous technologies were now dichotomized as incompatible, with the latter regarded as clearly inferior and undesirable. As a result, the Liu Xiang government who united the province for the first time in two decades in 1933 took over the leadership of developing sericulture technology from the local elites.

The most intensive efforts in fighting against indigenous sericulture technology were conducted during the Second Sino-Japanese War. While the provincial government continued introducing modern sericulture technology, the Nationalist government also directly intervened with sericulture in Sichuan. Chapter 8 concentrates on the involvement and impact of the Nationalist government on sericulture technological development. Specifically, it examines an unusual case of economic cooperation in southern Sichuan. The Chinese Communist Party (CCP), the Nationalist government, and the reformist intellectuals collaborated in the project of Leshan Sericulture Experimental Area (*Leshan cansi shiyanqu*) between 1938 and 1945. By the end of the war, despite the universal acknowledgment of the advantages of modern technology over indigenous ones, these reforms achieved limited success.

In many aspects, the process of sericulture technology diffusion in Sichuan was unique in modern China. First, as an inland province, it was the only major sericulture region in China without an outlet to the sea. Foreign influence was much weaker in the province than in the lower Yangzi or Pearl River deltas, the other two leading and more well-known raw silk producing regions. Interregional and domestic trade of silk goods was more prevalent than the international silk trade in modern Sichuan. Unlike the coastal China where technological spread significantly through cross-border means, domestic diffusion was the dominant mode in Sichuan right from the beginning.

Second, the province alternated between being the core or the periphery in accordance with rapidly changing national and regional political situations from 1901 to 1949. The involvement of the various central governments created more political and economic uncertainty in Sichuan than in the relatively stable coastal region, and complicated the process of technological diffusion. In particular, the phase during the Second Sino-Japanese War with the participation of the Nationalist government became the most significant era of technological transformation in Sichuan. This is in sharp contrast to the prevailing view of many Western and Chinese researchers on the history of Chinese silk and sericulture. Lillian M. Li, Lynda S. Bell, Alvin Y. So, Wang Xiang, and Liu Yonglian, for example, all held the idea that the war created a rupture in Chinese sericulture.⁶

Last but most importantly, remarkably diverse groups were actively involved in sericulture development during this period. They held divergent motivations, created different strategies, and expected different outcomes. The Imperial Court and its loyal provincial governments hoped to reverse the dynasty's collapsing fortunes through a last resort to reforms. Local Confucian gentry pursued economic

⁶ For instance, Lillian M. Li, *China's Silk Trade: Traditional Industry in the Modern World, 1842 – 1937* (Cambridge and London: Published by Council on East Asian Studies, Harvard University, Distributed by Harvard University Press, 1981); Lynda S. Bell, *One Industry, Two Chinas, Silk Filatures and Peasant-Family Production in Wuxi County, 1865-1937* (Stanford: Stanford University Press, 1999); Alvin Y. So, *The South China Silk District: Local Historical Transformation and World-System Theory* (Albany: State University of New York Press, 1986); Wang Xiang, *Jingdai zhongguo chuantong sichouye zhuanxing yanjiu* (Study on the transformation of traditional silk industry in modern China) (Tianjin: Nankai daxue chubanshe, 2005); and Liu Yonglian, *Jindai Guangdong duiwai sichou maoyi yanjiu* (Study on foreign trade of silk in modern Guangdong) (Beijing: Zhonghua shuju, 2006).

profit while following Confucian teaching to share the benefit with people in the whole province. Foreign investors exploited the cheap raw materials and labors for high profit. After the world economic depression, the Republican provincial government planned to monopolize the province's economic value, at the expense of the power and interest of the local elites in sericulture. During the Second Sino-Japanese War, the Nationalist government sought to utilize silk production for its wartime economy. The CCP mobilized the masses to produce for the war and ultimately to create a new China they anticipated. The intellectual rural reformers from the lower Yangzi delta, who were deeply concerned about rural livelihoods, actively spread modern technology. In addition, the peasants as the innovation receivers and real producers were lowly-placed but significant and rational agents in the use of these technologies.

Thus, there was never a single-minded commitment towards the adoption of foreign technology at the beginning. Rather, Chinese indigenous technologies were persisted with, and their replacement by foreign innovations was strongly resisted. It was only during the later phases of the first half century that the indigenous technology was considered completely backward and necessary of replacement by foreign technology.

Leap Forward and Continuity of Technology

The pattern of technological development in Sichuan sericulture is helpful in

understanding the nature of technological transformation⁷: does technological development proceed through revolutionary and iconoclastic innovations or gradual and accumulative progress? Joseph Schumpeter, who pioneered the innovation theory, argues the innovations are creative and destructive factors that replaced the established order of doing things. In looking at the origin and development of capitalism, he argues, “The fundamental impulse that sets and keeps the capitalist engine in motion comes from the next consumers’ goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates.”⁸ The innovations, particularly, the introduction of new products and the application of new technology for production, are creative and destructive factors that replaced the established order of doing things. He approaches economic progress through the perspective of discontinuous technological leaps. Arnold Heertje notices, “In Schumpeter’s conception of innovation, the continuous stream of minor improvement in equipment and products, sometimes called continuous technical development, is completely lacking.”⁹

Disagreeing with Schumpeter’s leap forward model, Nathan Rosenberg suggests

⁷ Technology is a set of techniques for producing goods. It includes both hardware that are physical objects and the software such as information and organizational service for the application of objects. Technology might be equipment, goods, ideas, events, services, and unwritten knowledge, as well as the management processes that combine all inputs. In many cases, new technology is regarded interchangeably with innovation. This work follows this practice.

⁸ Joseph A. Schumpeter, *Capitalism, Socialism and Democracy* (New York: Harper, 1975), pp. 82-83.

⁹ Arnold Heertje, *Schumpeter on the Economics of Innovation and the Development of Capitalism* (Cheltenham, UK; Northampton, MA: Edward Elgar, 2006), p. 91.

that innovation proceeds incrementally.¹⁰ The first introduction of innovation cannot cause dramatic impact on production and trade. Technological development is a continuous progress that is not finished after the first introduction of innovation. Historians have the tendency of demarcating the “new” and the “old,” by ignoring the persistence of old technologies. “[I]t is a very general practice among historians to fix their attention upon the story of the new method as soon as its technical feasibility has been established and to terminate all interest in the old.”¹¹ In reality, even though new technology has been introduced, it does not cause the existing technology to be obsolete immediately. The existing technology continues to be improved alongside the new technology introduced.

The case of sericulture in modern Sichuan in fact reveals both the drastic leap forward and incremental models of innovations. In encountering the modern world, indigenous technology was not spontaneously abandoned and immediately replaced by the innovative technology from the foreign countries. Instead, local people continued to improve traditional techniques through incremental innovations, in responding to the new market demand. The improved indigenous technology, for a certain period of time, was more advantageous than foreign technology because of its suitability for the local environment. It could bring about more optimal usage of available resources than the alien technologies, and therefore persisted for a period

¹⁰ Nathan Rosenberg, “Factors Affecting the Diffusion of Technology”, *Explorations in Economic History*, 10, 1 (Fall 1972), pp. 3-33; and *Exploring the Black Box: Technology, Economics, and History* (New York: Cambridge University Press, 1994).

¹¹ Nathan Rosenberg, “Factors Affecting the Diffusion of Technology”, p. 23.

of time, until the equilibrium of factors that framed the optimal arrangement of resources was disturbed and consequently dismantled. In the first decade that this work studies, there was significant emergence of indigenous technological improvements in Sichuan. In the following two decades, indigenously developed technology dominated sericulture production. It was only till later that the innovators regarded foreign modern technology as superior and stopped improving and spreading indigenous technology. They tried hard to replace the indigenous technology with the foreign one. Even so, indigenous technology persisted in Sichuan due to its appropriateness.

However, for the underdeveloped region that had not formerly been exposed to any modern influence, the pursuit of industrialization and modernization implied the necessity of acquiring foreign knowledge and skills. The indigenously improved technology will not ultimately stimulate economic progress, since these improvements are only small amendments implemented without accompanying fundamental transformations. The evolution of the modern world suggests that the breakthrough depended on the knowledge and skills that were based on the application of modern Western scientific principles.

The appearance and introduction of foreign innovations represented a leap forward in itself. It created a new trajectory of technological development that was completely different from the traditional techniques. Despite the resistance and obstruction of the existing social system, the new trajectory revealed a much

stronger dynamic for speeding up the process of economic progress in a relatively shorter time than the previous dependence on existing traditional technology permitted. In modern Sichuan, through the introduction of mechanized filatures, the non-agricultural stage of sericulture was separated from rural handicraft industry and became unprecedentedly industrialized. In particular, the central and provincial governments in the 1930s and 1940s held strong commitment towards sericulture modernization. They clearly identified themselves with the modern technologies and pursued the drastic transformation in production. It was ultimately the industrialization of silk reeling, the spread of new varieties, and the adoption of new treatment of mulberry and silkworm, that led to the drastic increased output and quality of sericulture in Sichuan. The commitment was finally achieved in the 1950s through firm and intensive Communist government programs.

Industrialization and modernization in developing countries was characterized by both revolutionary transformations and incremental reforms. The modernization of the sericulture industry thus presents an excellent case study that provides insights on the nature of technological progress. This, in turn, facilitates the examination of the factors underpinning the slow adoption of modern technology, and the consequent slow economic growth in sericulture.

Deskilling and Re-skilling

In *Eating Rice from Bamboo Roots, the Social History of a Community of Handicraft Papermakers in Rural Sichuan, 1920-2000*, Jacob Eyferth concentrates his

discussion on “skill” that was both physically embodied in the rural papermakers and embedded in the historical and social conditions. He argues there was a deskilling process in the papermaking industry in Jiajiang county, Sichuan, which started in the 1920s and climaxed in the 1950s and 1960s. The papermakers were deprived of their skill through two processes. First, the state’s industrialization efforts aimed at increasing economic efficiency through the division of labor and the alienation of the producer from his product. The result was the simplification of job complexity. At the same time, papermaking artisans were not the sole holders of skills any more, when the educated elites and governmental agents achieved the access to the secrets of papermaking that was tacitly possessed by the artisans. The educated elites obtained and redistributed the traditional knowledge and skill, and hoped to remove inefficiency and irrationality. Although Eyferth suggests that the deskilling was far from complete and new skills in other forms of rural production emerged at the end of the studied period, he favors the idea that papermaking industry itself experienced deskilling in the twentieth century.¹²

My work on sericulture shares much resemblance to Eyferth’s study on the papermaking industry. Both works focus on the technological transformation in Sichuan Province in the twentieth century. The papermaking Jiajiang county was also one of the chief raw silk producing countries in Sichuan, and a region where the

¹² Jacob Eyferth, *Eating Rice from Bamboo Roots, the Social History of a Community of Handicraft Papermakers in Rural Sichuan, 1920-2000* (Cambridge and London: Published by the Harvard University Asia Center, Distributed by Harvard University Press, 2009).

national sericulture reform agents intervened in the late 1930s and early 1940s. Both papermaking and silk production were agrarian-based, fundamentally dependent on the yield from land, but ended in non-agricultural sector. They were primarily handicraft industry conducted within the rural households, and tightly integrated with the rural economy. The end products of paper and raw silk were commodities that went to markets rather than for household subsistence consumption.

While Eyferth emphasizes skill degradation within the rural handicraft industry, this thesis extends his approach by arguing that both deskilling and re-skilling processes occurred in the development of sericulture technology. First, the type of deskilling where the educated elites and governmental agents extracted knowledge from papermaking artisans never took place in sericulture in modern Sichuan. Sericultural manuals have traditionally been in the reservoir of Chinese commonly shared knowledge. Second, whether the simplification of a job constitutes a form of deskilling needs reevaluation. Harry Braverman first formulated the thesis of deskilling of work under capitalism through his reading of Karl Marx. This thesis was widely accepted but also critiqued by social scientists. Theoretically, Paul S. Adler suggests Braverman has misinterpreted Marx, arguing that the evolution towards a capitalist system was characterized not by skill degradation as Braverman suggests, but skill upgrading.¹³ Other researchers demonstrate empirically that different work profiles created different skill requirement. While the complexity of some jobs was

¹³ Paul S. Adler, "Marx, Machines, and Skill", *Technology and Culture* 31, 4 (October 1990), pp. 780-812.

reduced, other jobs exacted high skill requirements.¹⁴ At the time that old technology became obsolete, new technology was created. The workers responded to the new technology by acquiring new skills.

As in the advanced manufacturing industry, the transformation of sericulture in modern Sichuan reflected both decreasing and increasing complexity of job. Peasants traditionally held the skills that allowed overall control of raw silk production within rural households. They knew how to preserve and treat silkworm eggs, to cultivate and transplant mulberry seedlings, to rear silkworms, and to reel raw silk from cocoons. They could produce nearly all required raw materials for producing raw silk. Although the reeling devices required carpenters to build them, these carpenters were often fellow villagers who were easily approached. The maintenance of reeling devices required no special skills and knowledge. In the pre-modern rural society in Sichuan, peasants held the complete set of skills of sericulture.

The efforts of introducing new technology in the early phases did not deprive peasants from utilizing their skills. Before the 1930s, the reformers largely integrated the new knowledge with the traditional ones. Peasants were encouraged to increase their knowledge and skill and kept overall control, from silkworm eggs production to cocoons production. The process of deskilling was only significantly reflected in individual household popularly withdrawing from reeling raw silk. With the

¹⁴ For instance, Toby D. Wall, et al, "Manufacturing Technology and Work Simplification: An Empirical Study", *Journal of Occupational Behaviour* 8, 3 (July 1987), pp. 233-250.

emergence of specialized factories and workshops, many peasants chose to sell cocoons rather than reeling by themselves.

More rapid simplification of the rural sericultural skills ensued following the governmental sericulture reforms from the 1930s. To some extent, peasants were deskilled in the process of modernizing sericulture due to the obsolescence and abandonment of their traditional techniques. The modernization reforms promoted improved silkworm and fine mulberry varieties. For yielding cocoons of higher quantity and quality, peasants had to give up breeding native silkworms and nurturing native mulberry saplings domestically. They had to rely on official or private institutions for the supply of essential raw materials.

Nevertheless, the governmental reforms in the 1930s and 1940s, as well as those in post-1949, went beyond providing new varieties and deskilling peasants. The governmental reforms actively infused peasants with new knowledge and skills that helped to achieve the ideal performance of the new varieties. Activities such as disease prevention and control, disinfection of equipment, accurate management on temperature and ventilation, efficient feeding and cleaning of cocoons, identifying, preventing, and curing diseases, all suggest an upgrading of skills in rural sericulture. The training on rural silkworm raisers is therefore, not a tendency of deskilling, but an effort of re-skilling.

Sources

The tradition of compiling local gazetteers preserved a considerable number of valuable source materials for students of the history of China. For the time period covered by this study, the nineteenth century and the first half of the twentieth century there was an abundance of gazetteers produced. Many gazetteers note that silkworms, mulberry trees, and silk were their local products, and list the local cocoon markets and silk markets. Some gazetteers record rituals related to sericulture and silk production. However, the majority of gazetteers provide little information beyond that sericulture existed in the region and was important to the local economy. In 1983, the National Supervising Team of Gazetteer Compiling (*Zhongguo difangzhi zhidao xiaozu*) was established in Beijing, inaugurating another tide of compiling local gazetteers. These new gazetteers offer more statistical data, but focus on the post-1949 period.

The People's Republic of China created a tradition of recording local history similar to the local gazetteer – the compiling of “Materials of literature and history” (*Wenshi ziliao*). *Wenshi ziliao* contains more detailed and more vivid information than local gazetteers. Governments from the provincial level down to the county level all set up special offices in charge of the periodic editing of *Wenshi ziliao*. The silk industry and silk trade was the most important industry in modern Sichuan, and continued to play a significant role in the economy of many counties till the end of the twentieth century. It is not surprised that local and provincial *Wenshi ziliao* records present abundant material on the silk industry. Although many articles bear strong ideological bias due to the historical context of their production, the writers

were primarily people of high rank in the industry who were familiar with the industry and knew a lot of inside stories, which makes the materials highly reliable. *Wenshi ziliao* thus serves the study by offering substantial data unavailable in other academic analyses and statistic records.

The Westerners and Japanese made painstaking investigations of modern Sichuan, which provide the earliest detailed accounts on the silk industry of the province. The first British Consul-General in Sichuan, Alexander Hosie, detailed the various means of silkworm raising, silk reeling, and silk weaving in the province at the turn of the twentieth century.¹⁵ The Japanese reports made by Uehara Shigemi are the most reliable materials on Sichuan silk in the 1920s. It was firstly published as monograph called *Shina Shisen shō no sanshigyō* (Sericulture in Sichuan), then was compiled into *Shina sanshigyō taikan* (A general survey of sericulture in China). The latter work makes possible the comparative study of the silk industry in different region during the same period. Other foreign studies provide various data about Sichuan's social economy. For example, H. D. Brown from the West China University surveyed the peasant economy in Sichuan in the middle 1920s. His works are important sources for the research on Sichuan before 1930. In 1936, Kanda Masao

¹⁵ Alexander Hosie, *Report by Consul-general Hosie on the Province of Ssuch'uan: Presented to both Houses of Parliament by Command of His Majesty* (London: H.M.S.O., 1904); and *Szechwan, Its products, Industries and Resources* (Shanghai: Kelly & Walsh, Limited, 1922). At the same time, other works composed by Hosie are also informative for understanding Sichuan at the turn of the twentieth century, such as *Three Years in Western China: a Narrative of Three Journeys in Ssu-ch'uan, Kuei-chow, and Yun-nan* (London: Philip, 1890); and *On the Trail of the Opium Poppy: a Narrative of Travel in the Chief Opium-Producing Provinces of China* (London, Philip, 1914).

published a work on Sichuan, *Shisen shō sōran* (Overview of Sichuan), with an entry on Sichuan's principal exports.

Professional Chinese investigations and surveys in Sichuan did not appear in large numbers until the 1930s, and were the most prevalent during the Second Sino-Japanese War. A variety of economic, political, and educational institutions published detailed reports on the rural economy, financial matters, and society in Sichuan during the war. There are also specialized investigations and research on the silk industry and sericulture. These accounts study both Sichuan province as a whole, and leading sericulture regions such as Santai, Nanchong, and Leshan individually.

Contemporary journals, newspapers, and unpublished archival documents further support this work. Among all the journals referred to, the *Sichuan yuebao* (Sichuan monthly), the *Jianshe zhouxun* (Reconstruction weekly), and the *Funü xinyun* (Women's new life movement) are the most informative. The Baxian archives preserve files on the Manchu governmental policies on sericulture and social responses during the last years of the Qing, on which the chapter on the New Policy reforms heavily relies. The documents from the Archives of Leshan provide insights into the local silk industry between 1938 and 1945. In addition, two individuals have been interviewed in the process of completing this study – Chen Gangzu, the grandson of a silk tycoon in Republican Sichuan, and Zhang Maolin, the current chief and also the descendant of workers of the provincial Silkworm Breeding Station in Suqi, Leshan.

CHAPTER ONE

Background: the Shaping of a Modern Rural Sichuan

Sichuan is an inland province located at the upper Yangzi River in southwest China. Ecologically, its eastern part had fertile lands that could support a large population agriculturally, and provide abundant resources for its handicraft industry. Its geographical location and topographical features helped create a region that was hard to penetrate from the outside, but permitted easy internal transportation. Historical developments during the Qing dynasty, accompanied by these natural circumstances, led to a highly stratified society with a developed local commercial system and prosperous trade in agricultural products.

Agricultural Geography

Sichuan is topographically divided into a western mountainous region and an eastern basin. The western section of the province is constituted of a mountainous plateau at the southeastern edge of the Tibetan Plateau. The average temperature is low and winter is long due to its high altitude. There are few agrarian lands. Animal husbandry is the main rural economic activity. In the eyes of foreign visitors in the early twentieth century, the area was “almost uncultivated, inhabited by aboriginal tribes, and sparsely populated.”¹ During 1939 and 1955, this section became

¹ Robert J. Davidson and Isaac Mason, with Timothy Richard, *Life in West China, Described by Two Residents in the Province of Sz-chuwan* (London: Headley Brothers, 1905), p 32.

independent from Sichuan and was known as Xikang Province.

This work primarily focuses on the eastern section of Sichuan Province, including Chongqing, which was a part of Sichuan historically but was separated from it in 1997. This section is known as the Sichuan Basin, or often also called “Red Basin” because of the color of its soil. Framed by high mountains, the Sichuan Basin is made up of rolling country, low mountains, and alluvial plains, of which the Chengdu plain is the largest and the most fertile. Its agriculture, culture, and social structures were very different from the western mountainous part. At the beginning of the twentieth century, it was “fertile, swarming with life and industry, and forms one of the most productive regions in the whole of China”.²

Overall, the combination of climatic and geographic conditions favored agriculture in the Sichuan Basin. Its arable land and output of foodstuff and economic crops accounted for over 90 percent of those of the province.³ The Sichuan Basin was gifted with warm and moist subtropical monsoon climate, fertile lands, and an abundant variety of vegetation, due to the protection of the mountains surrounding it on all sides and the wind currents from both the Pacific and the Indian Oceans. Precipitation is abundant in summer, which allows for a high yield of summer crops. It is also warm and frost-free for long spells during winter which is favorable for crops surviving through winter. It is even warmer in winter, and spring

² Robert J. Davidson and Isaac Mason, with Timothy Richard, *Life in West China*, p. 32.

³ Zhongguo kexueyuan Chengdu dili yanjiusuo, ed., *Sichuan nongye dili* (Agricultural geology of Sichuan) (Chengdu: Sichuan renmin chubanshe, 1981), p. 5.

comes earlier than in the fertile lower Yangzi delta. It was well-known as the “country of treasures” (*tianfu zhiguo*).

However, the climate and geography within the Sichuan Basin are not homogenous throughout its mountainous edges, low hills, and alluvial plains. The distinct climate and topographical conditions had significant impact on the peasants’ choice of crops, as I will show. The mountainous region enveloping the Sichuan Basin is of high humidity and low sun radiation. It is less densely populated, and colder than the other two regions.⁴ The economy in this region largely depended on mountain products. In mountainous northern Sichuan, for instance, forestry, mineral mining, and paper production which was in turn reliant on bamboo cultivation, were predominant in the modern era.⁵

The hilly area is within a range of 200 to 700 meters above sea level. The frost-free season range between 280 and 350 days. The percentage of paddy fields is only slightly higher than that of dry lands. The terrain is primarily made up of the purple-brown soil that is of relatively high fertility, but not as fertile as that in the alluvial plains. The hills are often terraced for agricultural farming. Some are not suitable for agricultural farming, are however populated by trees of economic value,

⁴ Sichuansheng difangzhi bianzhuanyuanhui ed., *Sichuan shengzhi, nongyezhi* (Sichuan province gazetteer, agriculture) (Chengdu: Sichuan cishu chubanshe, 1996), pp. 43-44.

⁵ C.-Y. Hsiang, “Mountain Economy in Szechuan”, in *Key Papers on Chinese Economic History up to 1949*, ed. Michael Dillon (Folkestone: Global Oriental, 2008), vol. 1, pp. 163-165.

such as mulberry, wood oil, and fruit trees.⁶

The richest and fertile region is the alluvial plain which centered on Chengdu, the provincial capital, at the western side the Sichuan Basin. The annual average temperature there is over 16 degrees Celsius, and it is almost frostless in the winter.⁷ Annual precipitation is abundant and soil is high in fertility in this region. It is one of the most fertile and densely populated regions in China. According to an investigation in the 1920s, there were about 800 occupants to a square mile, and this ratio only shows the agricultural land excluding the towns or cities. This figure was in sharp contrast to the general population density of the province, at 286 per square mile.⁸ The area of the Chengdu plain accounted for only 4.2 percent of the total land area of the province, but cultivable land accounted for 12.5 percent of that of the province, according to the survey made in 1979. Despite the high population density, per capita output of foodstuff crops was still the highest in the province.⁹

“Access to Sichuan was Hard, Harder than Reaching the Sky.”

As a basin framed by high mountain ranges, transportation in Sichuan was characterized by difficult connections with the outside world but convenient

⁶ Sichuansheng difangzhi bianzhuang weiyuanhui ed., *Sichuan shengzhi, nongyezhi*, pp. 41-43.

⁷ John Lossing Buck, *Land Utilization in China, A Study of 16,786 farms in 168 localities, and 38, 256 farm families in twenty-two provinces in China, 1929 – 1933* (New York: Paragon Book Reprint Corp., 1968), p. 79.

⁸ H. D. Brown and Li Minliang, “A Survey of 50 farms in the Chengdu Plain, Szechwan”, *Chinese Economic Journal* 2, 1 (January 1928), p. 49.

⁹ Sichuansheng difangzhi bianzhuang weiyuanhui ed., *Sichuan shengzhi, nongyezhi*, pp. 39-40.

intra-provincial access. The lack of accessibility to the outside made Sichuan a relatively isolated region from the rest of China, but it boasted of a developed transportation system that facilitated economic and cultural connections within the province.

The Yangzi River was the chief channel connecting Sichuan and eastern China. It runs from west to east, cuts through the southern edge of the basin, and forces its way through the mountains that sever Sichuan from the rest of the world. The swift rapids, precipitous gorges, and dangerous rocks, however, made this waterway not an easy route for leaving or entering Sichuan. A Western traveler recalled his first journey to Chongqing by water in 1909,

“[O]n one’s arrival at the Ichang the totally different character that the river assumed in the next stage of the voyage at once made itself manifest. A mountain wall towered ahead, seemingly forming a total barrier to further progress by the river and making evident the difficulties that were to be encountered. No more of the dead level paddy plains, but precipitous gorges; no more of the gentle current, but instead fierce rapids; no more mud- and sandbanks, but a river strewn with jagged rocks, so that many years of efforts were needed before the problem of its navigation by steamers was solved.”¹⁰

Navigating the rapid and complicated upper Yangzi River was extremely difficult.

¹⁰ W. Stark Toller, “Old Days up the Yangtze”, *Eastern World* 2, 8-9(August -September, 1949), p. 36.

Ships were steered by hundreds of thousand junk trackers in the Yangzi River between Chongqing and Wanxian. Junk tracking was arduous and painstaking labor-intensive work. The towing path was often no more than a goat track and even more hazardous when it rained. "An hour might be spent in working the boat round one point and then, with the snapping of a towline, the boat would be caught in the current and swept away. If one were lucky, a day's work would be lost, but the misfortune might extend to the total loss of the boat."¹¹

Junks were the traditional vehicle of waterway transportation, even though the first steamer arrived in Chongqing in 1898. The steamers of the Minsheng Company established by Lu Zuofu in 1925 gradually monopolized the steamer traffic on the upper Yangzi River, but junks were still in dominance during the first half of the twentieth century. In the early 1940s, there were about 6,400 junks on the Jialing River and the Chongqing section of the Yangzi River.¹²

Another waterway that provided transportation between Sichuan and other provinces was the Qian River. It was the major route to Guizhou Province. But this route was not much better than the Yangzi River in terms of dangers. During the flood seasons, junks and boats all ceased operation.¹³

In comparison to the waterways, there were more overland routes connecting

¹¹ Ibid., p. 37.

¹² Zheng Ziyue, *Sichuan xin dizhi* (New topographic study of Sichuan) (Shanghai: Zhengzhong shuju, 1947), p. 277.

¹³ Ibid., p. 266.

Sichuan and the outside, but traversing these was fraught with even more difficulties. The Tang poet Li Bai (701 – 762) lamented that “Access to Sichuan was hard, harder than reaching the sky.” The route to the Tibetan Plateau to the west of the province rose up from 500 meters to 4,000 meters in altitude. To Yunnan Province to the south, the roads crossed mountains and rivers. The several major journeys to Shanxi and Gansu Provinces in the north had to pass through the mountainous ranges of Qingling. Some parts of the route crossed wild areas or even narrow alley carved on the cliffs. To Hubei Province to the east, the land journey went alongside the Qingjiang River valley. Before arriving into the region of Hubei province, travelers had to take the road cut halfway up the mountains with deep gorges underneath.¹⁴

The lack of accessibility between Sichuan and the rest of China made it difficult for outside threats to conquer Sichuan. The region of Sichuan historically often assumed autonomy by claiming independence from the central government when the latter was weak, and it was never easy for the central government to recover political, economic, and military control over Sichuan. In the 1910s and 1920s, Sichuan again became a de facto independent region controlled by warlords. It was also partly because of this difficulty of penetration that the nationalist government retreated to Chongqing in 1938 after the outbreak of the Second Sino-Japanese War and successive losses of major Chinese cities to the Japanese troops. In addition, the Western influence in culture, technology, and economy permeated into Sichuan with slow speed and great difficulty due to the distance between the province and coastal

¹⁴ Ibid., p. 290-294.

regions and the inconvenient lack of easy communication and transportation.

Within the mountain perimeter however, the bottom of the basin had a rather well developed transportation network. Rivers and tributaries runs through the basin, mostly from north to south, and eventually converge on the Yangzi River that passes the basin from west to east. Many rivers, which run down from the mountains, are navigable at the bottom of the basin. The major waterways include the Min, Tuo, Jialing, Fu, and Qu rivers. Including the Yangzi and Qian rivers, over 10,294 kilometers of rivers were navigable within Sichuan.¹⁵ A variety of agricultural and industrial commodities were transported through these rivers by junks and later, steamers.

At the same time, “the whole of the province is supplied with main roads between the chief centers, and smaller ones to all the towns, villages, and markets.”¹⁶ These roads were often stone-paved, ranged from 7 meters to 0.3 meters in width, depending on importance. There were stone inscriptions indicating direction and distance at the junction of roads. Sedan chairs could travel 50 kilometers daily, while porters could proceed 30 kilometers per day. Contemporary accounts argue that its transportation system was the most convenient and developed among all the Chinese provinces in terms of pre-modern Chinese road.¹⁷

The construction of modern roads started in the early twentieth century in Sichuan,

¹⁵ Ibid., p. 276. This included a short distance of the Yangzi River from the border of Sichuan to Yibing in Hubei Province that is commonly considered as an essential part of “Chuanjiang” (*lit.* the river of Sichuan), the Sichuan section of the Yangzi River.

¹⁶ Robert J. Davidson and Isaac Mason, with Timothy Richard, *Life in West China*, p. 34.

¹⁷ Zheng Ziyue, *Sichuan xin dizhi*, p. 283.

and developed particularly during the Second Sino-Japanese War. With the subsequent introduction of automobiles, these modern roads began to provide for faster transportation.

The well-connected intra-provincial transportation system facilitated the shaping of sophisticated marketing networks in Sichuan. Hosie observed the pervasiveness of markets in Sichuan in the 1880s that “[s]mall market-towns are thickly dotted over the whole province, and at each place a market is held every five days.”¹⁸ William G. Skinner further drew a systematic analysis of the marketing hierarchical system, primarily based on his research on Sichuan. The Skinnerian market system comprised standard market towns, intermediate market towns, central market towns, local cities, greater cities, regional cities, regional metropolises, and central metropolises. The three kinds of market towns were among the lower levels of the hierarchy. County seats were intermediate or central market towns, and often belonged to the latter category.¹⁹ Skinner identified a total of 408 central places characterized by economic and commercial functions of urban places in the upper Yangzi macroregion that was equivalent to Sichuan Province in 1893, including 2 metropolises, 6 regional cities, 21 greater cities, 87 local cities, and 292 central market towns. According to Skinner, the transportation system available largely determined the sitting of these central places in Sichuan.²⁰

¹⁸ Hosie, *Three Years in Western China*, 1890, p. 21.

¹⁹ G. William Skinner, “Marketing and Social Structure in Rural China: Part I”, *Journal of Asian Studies* 24, 1 (November 1964), p. 9.

²⁰ G. William Skinner, “Introduction, Urban and Rural in Chinese Society”, in *The City in Late Imperial China*, ed. G. William Skinner (Stanford: Stanford University Press,

Shaping of Rural Structure in the Qing

Not only natural and environmental conditions, but also social structure was responsible for the economic condition and production choices in Sichuan. In Sichuan, the expansion of the population created a highly stratified society during two centuries of the Manchu governance.

The social structure of Sichuan during the Qing dynasty was founded on the disorder during the Ming-Qing transition. What the dynastic transition left was a deserted Sichuan with a small population and substantial waste lands. The wars wiped out the large landlord economy present during the Ming dynasty. From the late Ming to 1680 when the Manchu government completely controlled the province, Sichuan was the fighting field between various local rebels and the Ming suppressors, between rebellious Zhang Xianzhong's troops and the Southern Ming's troops, between Zhang's troops and the Manchu armies, between the Southern Ming and the Manchu troops, and between the armies of feudal lord Wu Sangui and the Manchu armies.²¹ According to the official records, there were only 18,509 male adults in 1685.²² However, many historians suspect that the number was an exaggeration and estimate that the population was about 500,000 to 600,000 during the early Qing.²³ Nevertheless, even this number is much less than that in the Ming

1977), p 291-293, 298.

²¹ Sun Xiaofen, ed., *Qingdai qianqi de yimin tian Sichuan* (Immigration to Sichuan in the early Qing) (Chengdu: Sichuan daxue chubanshe, 1997), pp.2, 8.

²² *Qingchao wenxian tongkao* (General study of literary records in the Qing), *juan* 19, (Hangzhou: Zhejiang guji chubanshe, 2000), p. 5025.

²³ Sun Xiaofen, *Qingdai qianqi de yimin tian Sichuan*, p. 14; Li Shiping, *Sichuan*

when the recorded population was 3,102,073 in 1578.²⁴ Cultivated land registered at the government was 1,188,350 mu in 1661²⁵, in sharp contrast to the figure of 13,482,767 mu in 1578.²⁶

The Manchu government carried out a series of policies to encourage land cultivation and population growth from the early Qing, especially during the Kangxi Reign (1662 – 1722). At the beginning of the Qing, people reclaimed land according to their physical ability. Reclaimed land was marked by tree stumps.²⁷ It was easy for peasants to register reclaimed lands and if they wanted to purchase lands, the price was low.²⁸ The Manchu government further implemented a series of supportive tax policies. It exempted all reclaimed land taxes for the first three years after the land was claimed. The policy was revised in 1671 by extending the untaxed period to four years for other provinces, and five years for Sichuan. In 1672, the policy was further revised to allow for a six-year tax-free duration for the newly reclaimed lands; and in 1673, ten-year duration.²⁹ Meanwhile, the head tax was frozen and integrated with

renkoushi (History of population in Sichuan) (Chengdu: Sichuan daxue chubanshe, 1987), p. 6; Liu Hongkang, ed., *Zhongguo renkou Sichuan fence* (Population of China, the division of Sichuan) (Beijing: Zhongguo caizheng jingyi chubanshe, 1988), p.54.

²⁴ Liang Fangzhong ed., *Zhongguo lidai hukou, tiandi, tianfu tongji* (Statistics of households, land, and land tax in all dynasties of China) (Shanghai: Shanghai renmin chubanshe, 1993), p. 341.

²⁵ *Qingchao wenxian tongkao, juan 1*, p.4860.

²⁶ Liang Fangzhong ed., *Zhongguo lidai hukou, tiandi, tianfu tongji*, p. 335.

²⁷ Sheng Xunwei, *Shunan xulüe* (Brief description of the disaster in Sichuan), in *Congshu jicheng xinbian* (Taipei: Xinwenfeng chuban gongsi, 1984), vol. 119, p. 777.

²⁸ Guo Songyi, “Qingchu Sichuan de ‘yimin kenhuang’ he jingji fazhan” (The “Immigration and relocation” and economic development in Sichuan in the early Qing), in *Qingdai quyue shehui jingji yanjiu* (Regional socio-economic research in the Qing), ed. Ye Xianen (Beijing: Zhonghua shuju, 1992), vol. 2, pp. 828-830.

²⁹ *Daqing shengzu ren (Kangxi) huangdi shilu* (Veritable records of Emperor Kangxi)

the land tax across the entire country in 1711, which relieved the population from the burden of tax collection and subsequently released the pressure on population growth. In the region where arable land was plentiful to support large population such as Sichuan, population increased rapidly.

At the same time, the government encouraged immigration. People from other provinces who immigrated into Sichuan were registered as legal residents in Sichuan, and their offspring could enter the imperial examinations as Sichuan residents.³⁰ In 1690, the Court granted immigrants with permanent ownership of the land they reclaimed.³¹ The Court and provincial government also encouraged governmental officials to recruit wanderers to settle down by tying the promotion of officials with their ability to recruit settlers.³² In 1673, the governor of Sichuan alone recruited a significant number of 1,428 households, which brought the issue of his promotion to the throne.³³ The local governments responded to this policy by renting cattle and seeds to the settlers at low prices, such as in Anxian and Pujiang, or organizing adults to farm, and taking care of children as in Xinjin.³⁴ Immigrants came from many parts

juan 36 (Taipei: Hualiang chubanshe, 1964), vol.1, p. 510. *Qingchao wenxian tongkao*, *juan* 2, p. 4865. Guo Shengbo, "Sichuan lishi nongye dili" (Historical agricultural geography of Sichuan) (PhD dissertation, Shaanxi shifan daxue, 1989), p. 102.

³⁰ Sichuan jianshi bianxiezu, ed., *Sichuan jianshi* (A brief history of Sichuan) (Chengdu: Sichuansheng shehui kexue yaun chubanshe, 1986), p. 183.

³¹ Sun Xiaofen, *Qingdai qianqi de yimin tian Sichuan*, p. 21.

³² *Qingchao wenxian tongkao*, *juan* 2, p. 4865. *Daqing shengzu ren (Kangxi) huangdi shilu*, *juan* 36, vol.1, p. 510.

³³ Guo Shengbo, "Sichuan lishi nongye dili", p. 103.

³⁴ *Chingchao wenxian tongkao*, *juan* 3, p. 4876. *Anxian zhi* (Anxian county gazetteer), 1933, *juan* 26; *Sichuan tongzhi*, 1735, *juan* 116, cited in Lu Zijian, *Qingdai Sichuan caizheng shiliao* (Historical materials on finance in Sichuan in the Qing) (Chengdu: Sichuan shehui kexueyuan chubanshe, 1984), vol. 1, pp. 15, 69; and Sun Xiaofen,

of China, including Guangdong, Fujian, Shaanxi, Jiangxi, Yunnan, Guizhou, etc. Hunan and Hubei supplied the majority of immigrants.

Large number of owner-cultivators appeared in the early Qing. Guo Songyi suggests that Sichuan's special situation made it the most significant province of owner-cultivators among China. There was vast amount of available land vis-à-vis a limited population. The wars suppressed the power of the powerful local landlords in the Ming dynasty. The Qing government implemented favorable political and economic government policies. All these factors combined to create an owner-cultivator society dominated by immigrants.³⁵

However, the population increased rapidly. A decree was made to restrict the land occupation in 1728. Each household could reclaim up to 30 mu of paddy field or 50 mu of dry land.³⁶ Local gazetteers and contemporary genealogies reveal that social stratification started as late as the early eighteenth century as a result. At that time, quite a few immigrants became tenants because of the lack of land to reclaim, and they had to rent lands to farm. On the other hand, some became large landlords by occupying large area of lands. For example, Li Maoliang migrated to Yunyang county from Hunan in 1705. He purchased lands and rented them out.³⁷ In the same

Qingdai qianqi de yimin tian Sichuan, p. 20.

³⁵ Guo Songyi, "Qingchu Sichuan de 'yimin kenhuang' he jingji fazhan".

³⁶ Jueluoledehong et al, *Daqing shizhong xian (yongzheng) huangdi shilu* (Veritable records of Emperor Yongzheng), *juan* 67 (Taipei: Hualian chubanshe, 1964), vol.2, p. 1055.

³⁷ *Minguo Yunyang xianzhi* (Republican Yunyang county gazetteer), 1935, *juan* 35, cited in Guo Songyi, "Qingchu Sichuan de 'yimin kenhuang' he jingji fazhan", p. 832, also in Lu Zijian, *Qingdai Sichuan caizheng shiliao*, vol. 1, p.79.

county, immigrant Zeng Yulian made a living as tenant at the end of the Kangxi Reign (1662 - 1722).³⁸ Guo Songyi found more cases in Baxian, Mianzhou, and Jianyang from local gazetteers in the Yongzheng Reign (1723 - 1735).³⁹ According to Shifang gazetteer, 180 out of 6080 households in Shifang in 1746 were tenants.⁴⁰ Despite the low percentage of tenants, the appearance and rise of social stratification was an irreversible trend.

Population growth contrasted sharply with the slowdown in land reclamation after the eighteenth century. The estimated population expanded to 8,142,487 in 1782, 20,755,770 in 1812, and 48,129,596 in 1912.⁴¹ Similarly, local gazetteers report high rates of population growth. For example, when Wang Peijing was posted as magistrate of Jingyan county in 1661, there was no resident inside the city-walls. After a hard effort of looking for residents, he found only 17 households and 38 male adults.⁴² The census in 1735 however indicated that the population increased to 1,801 households and 12,257 people including 2,008 male adults. Sixty years later, population expanded to 65,024. In 1894, there were 156,854 adults.⁴³ Similarly, when the magistrate office of the Qing government was set up in Lezhi in 1694, the

³⁸ *Minguo Yunyang xianzhi*, *juan* 28, cited in Noriko Mori, "Qingdai Sichuan de yimin huodong" (Immigration to Sichuan in the Qing), in *Qingdai quyu shehui jingji yanjiu*, ed. Ye Xianen, vol. 2, p. 840.

³⁹ Guo Songyi, "Qingchu Sichuan de 'yimin kenhuang' he jingji fazhan", p. 832.

⁴⁰ *Minguo Shifang xianzhi* (Republican Shifang county gazetteer), *juan* 5, cited in Guo Songyi, "Qingchu Sichuan de 'yimin kenhuang' he jingji fazhan", p. 830.

⁴¹ Li Shiping, *Sichuan renkoushi*, p. 6. By offering detailed analyses, the work is one of the most reliable studies on the population of Sichuan.

⁴² *Jingyan xianzhi* (Jingyan county gazetteer), 1795, *juan* 3; and *Jingyan xianzhi*, 1900, *juan* 4.

⁴³ *Jingyan xianzhi*, 1900, *juan* 5.

census only recorded only 27 native households. In 1906, there were 230,490 people in Lezhi.⁴⁴ In his research, Wang Di estimates that there were 778,380,000 mu of agrarian land in 1812, and 1,028,080,000 in 1910.⁴⁵ During the one hundred years from 1812 to 1912, the population more than doubled, but agrarian land had expanded only by a third.

Local gazetteers produced during the nineteenth and early twentieth centuries usually discuss the problem of overcrowding population (*renman*) in sad and worried tones. The Wanxian gazetteer edited in 1866 describes that any possible agrarian land in the wild mountains had already been cultivated.⁴⁶ In Jiangyou, “The land of one household is only enough for a few people. If there are many sons in one family, some have to be adopted by other relatives. It is because land is not enough for feeding people.”⁴⁷ In Jingyan county, where native residents were nearly wiped out at the beginning of the Qing dynasty, the population had increased by the 1890s to the point that that “Jingyan is especially crowded with people [among all places in Sichuan]. Over a half of households have no land. The price of field is so high that no other prefecture or county can compete.”⁴⁸

The result of the unbalanced expansion of land and people was the aggravation

⁴⁴ Sichuansheng Lezhi xianzhi bianzhan weiyuan hui, ed., *Lezhi xianzhi* (Lezhi county gazetteer) (Chengdu: Sichuan renmin chubanshe, 1995), p. 113.

⁴⁵ Wang Di, *Kuachu fengbi de shijie: Changjiang shangyou quyuan shehui yanjiu: 1644 – 1911* (Stepping out of the closed world, study on the upper Yangzi River, 1644 – 1911) (Beijing: Zhonghua shuju, 1993), p. 115.

⁴⁶ *Tongzhi zengxiu Wanxian zhi* (Revised Wanxian county gazetteer in the Tongzhi reign) (Chengdu: Bashu shushe, 1992 [1866]), *juan* 9.

⁴⁷ *Jiangyou xianzhi* (Jiangyou county gazetteer), 1840, *juan* 1.

⁴⁸ *Jingyan xianzhi*, 1900, *juan* 8.

of peasant society stratification. The rural society started stratifying into landlords, tenants, owner-cultivators, and agriculture works in the eighteenth century. Following this trajectory, the prevailing owner-cultivated economy at the early Qing had evolved into a highly stratified society since the nineteenth century and especially in the twentieth century. According to an investigation made by the Central Agricultural Research Bureau, 51 percent of the peasants in Sichuan in 1912 were tenants, 19 percent were part tenants, and 30 percent owner-cultivators. By 1933, accompanying the increase of tenants to 59 percent, owner-cultivators had dropped to 22 percent, which was much higher than the national average, 32 percent of tenants and 45 percent of owner-cultivators.⁴⁹ This verifies the lament of many local gazetteers that overwhelming numbers of tillers did not own any land.⁵⁰

Agricultural Commercialization

The commercialization of agriculture, the rural handicraft industry, and double, even multiple cropping were the major factors that held overpopulation and high tenancy levels in the society. Historical sources demonstrated the prosperity of cash crop cultivation in Sichuan from the eighteenth century. Peasants were engaged in producing a wide range of profitable agricultural products such as cotton, tobacco, sugar cane, fruits, safflower, herb, tea, wood oil, silk, ramie, hemp, rapeseeds oil, etc.

⁴⁹ Lü Pingdeng, *Sichuan nongchun jingji* (Rural economy of Sichuan) (Shanghai: Shangwu yinshuguan, 1936), p. 173.

⁵⁰ For example, the Republican gazetteers of Wenjiang, Meishan, Dazhu, Nanchong, Xuanhan, Wanyuan, Guanxian, Qianwei, Baxian, and Pixian all recorded high percentage of tenants in rural community. See Dai Angang, ed., *Zhongguo difangzhi jingji ziliao huibian* (Compiled economic source materials from gazetteers) (Shanghai: Hanyu dacidian chubanshe, 1999), pp. 41-45.

Most cash crops could grow up all over Sichuan. For example, cotton and rapeseeds were popularly produced everywhere. However, some regions developed specializations in certain cash crops. Rongchang was the center of ramie and ramie cloth production. Tea was the major cash crop in the mountains at the edge of the Red Basin. Wood oil was produced in large and good quality in eastern Sichuan, while white wax was harvested mainly in southern Sichuan. Sugarcane cultivation was concentrated on Fushun, Nanxi, and Neijiang. Tobacco became important cash crops in the Chengdu plain.

Cash crops were of high profit in the nineteenth century. Profit from cotton was equal to that from foodstuff crops in Renshou⁵¹, and double of that from grains in Pengxi⁵². In Renshou, indigo and safflower were more lucrative than cotton and grain.⁵³ Many peasants gave up rice cultivation in favor of indigo cultivation in Weiyuan in the late nineteenth century, because of the higher return from indigo than rice.⁵⁴ Cash crop cultivation created quite a few rich families. For instance, immigrants dominated sugar cane and tobacco cultivation in Nanxi. These cash crops required less labor in cultivation but generated more profit which distinguished rich immigrant cultivators from the poor natives in Nanxi.⁵⁵

Rural commercialization was further interwoven with the rural handicraft

⁵¹ *Renshouxian xinzhi* (New Renshou county gazetteer), 1837, *juan* 2.

⁵² *Pengxi xianzhi* (Pengxi county gazetteer), 1845, *juan* 15.

⁵³ *Renshouxian xinzhi*, 1837, *juan* 2.

⁵⁴ *Guangxu Weiyuan xianzhi* (Weiyuan county gazetteer in the Guangxu reign), 1877, *juan* 2.

⁵⁵ *Nanxi xianzhi* (Nanxi county gazetteer), 1874, *juan* 3.

industry. Many of these cash crops had to be processed before consumption. Accompanying the growth of cash crop cultivation was the prosperity of the handicraft industry based in both rural households and professional workshops. For instance, Rongchang specialized in making grass cloth made from ramie. Jiajiang was famous for turning bamboo into paper. Neijiang became the “Sugar Town”, and Xiushan benefited from producing wood oil. In addition, peasant households widely practiced subsidiary handicraft production such as straw hats weaving, cotton spinning and weaving, and palm brush making.

Conversely, commercialized agriculture brought high risks, but the practice of multiple cropping diminished the risk of relying on cash crops to a large extent. Peasants, especially those petty producers did not have to risk all their lands on a monocrop system. Due to the warm climate and variety of vegetation, multiple cropping combining foodstuff and cash crops was prevalent in the Sichuan Basin. “There are always two crops a year, many times there, and as high as four or five in areas where vegetable growing is common [in the Chengdu Plain].”⁵⁶ Not only in the Chengdu Plain, but also in the whole Sichuan Basin, two or three crops a year were widespread. Travelers were often impressed by the evergreen landscape once they arrived into Sichuan. When one crop failed, it was possible to make up through other crops. For example, in Rongxian in 1765, Qiu Youzhang and Zeng Jincheng rented dry lands from Wu Tingxiang to plant cotton together. Due to a bad harvest, the income

⁵⁶ H. D. Brown and Li Minliang, “A Survey of 50 farms in the Chengdu Plain, Szechwan”, p. 45.

from cotton did not meet the expense of cultivation. Qiu hoped to “recover the loss (*fanben*) through winter crops”. But Zeng secretly cancelled the old tenure and planned to cultivate the land alone. (Qiu demanded that Zeng return the 4 taels of rent that he paid for the year since the one year had not elapsed. In the dispute, Qiu killed Zeng.)⁵⁷

Multiple cropping and subsidiary economic activities were an important means for tenants to survive the ever-increasing rent rate. According to Republican economist Zhang Xiaomei, rent in Sichuan was among the highest in China, ranging from 37 to 59 percent of crops depending on land quality in 1929. Rent kept increasing in the 1930s. It became common for tenants to submit 80 percent of their crops to the landlords.⁵⁸ But it was a custom that landlords only charged a share from one season of crop of regular grains, which was rice for paddy fields, or maize or beans for dry lands after the harvest in autumn. In case of cash rent, the amount was the market value of similar amount of grains.⁵⁹ Tenants, hence, kept the winter crops and other subsidiary products from the land and household production such as bamboos, fruits, fishes, silk, etc. Taking winter crops into consideration, historian Li Deying estimates the rate was about 50 percent of the products in the Chengdu Plain

⁵⁷ Zhongguo diyi lishi danganguan and zhongguo shehui kexueyuan lishi yanjiusuo, *Qingdai dizu boxue xingtai*, p. 305.

⁵⁸ Zhang Xiaomei, *Sichuan jingji cankao ziliao* (Reference materials for economy of Sichuan) (Shanghai: Zhongguo guomin jingji yanjiusuo, 1939), p. M5-M6.

⁵⁹ Minben, “Sichuan nongmin de shenghuo guan” (Philosophy of life of peasants in Sichuan), *Shuping zazhi* 3 (1925), p. 15; Zhang Xiaomei, *Sichuan jingji cankao ziliao*, p. M2; H. D. Brown and Li Minliang, “A Survey of 50 farms in the Chengdu Plain, Szechwan”, p. 48; and “Hechuanxian nongcun shehui diaocha” (Survey on rural society of Hechuan county), *Jianshe zhouxun* 1, 5 (April 1937), p. 10.

in the Republican era.⁶⁰ In the following chapter, I will further identify the importance of silk to rural economy.

Conclusion

Located in the upper Yangzi River, Sichuan was gifted with warm climate, fertile soils, and abundant precipitation. Environmental conditions made possible a wide range of agricultural crops and multiple cropping. The topographic characteristics of the region created a convenient transportation system within the basin that facilitated the evolution of a sophisticated market system. While the land was initially sparsely populated, local society was highly stratified due to the rapid expansion of population. High tenancy and high rent were so prevalent in the Sichuan Basin that it required the peasants to pursue agricultural commercialization, multiple cropping, and participate in handicraft industries. The commercialization of agriculture and the market structure reinforced each other and developed together during the Qing dynasty. Despite the existence of the market system reaching out to the metropolis, and even the international market, it is notable that the mountain-framed geographic location hampered the province from more efficient interaction and communication with the outside world. It was against this inter-locking set of environmental, social, and economic circumstances, the following chapters will reveal that sericulture in Sichuan developed characteristics unique to the region.

⁶⁰ Li Deying, *Guojia faling yu minjian xiguan: minguo shiji Chengdu pingyuan zudian zhidu xintan* (State policy and folk custom, new perspective on tenancy system in the Republican Chengdu plain) (Beijing: Zhongguo shehui kexue chubanshe, 2006), p. 147.

CHAPTER TWO

Rural Sericulture and Peasants

Sericulture was a rural industry that was tightly connected with the peasantry. It was the essential part of the ideal Chinese agrarian model that was portrayed as a rural world where men farmed while women wove. In reality, for a very long period in Chinese history, peasants were also taxed on raw silk or silk goods. Peasants were involved in the entire process of sericulture – from cultivating mulberries on their farms to reeling raw silk in their houses. Even after workshops and factories took over the tasks of reeling raw silk, the production of cocoons was still part of rural sericulture.

This chapter focuses on the practice of rural sericulture in Sichuan. Scarce attention has been paid to studying the relationship between sericulture and the rural economy in Sichuan. Historians of Sichuan such as Wang Di, Lin Dun, and Peng Tonghu unanimously cited a variety of local gazetteers to attest to the prosperity of sericulture in rural Sichuan during the Qing dynasty, which has also persisted well into the modern era.¹ Their studies on the role of sericulture in the rural economy in Sichuan however do not extend beyond gazetteer accounts. Lillian M. Li's empirical

¹ Wang Di, *Kuachu fengbi de shijie*, p. 149; Lin Dun, "Qingdai qianqi Sichuan shangye maoyi yu shehui jingji de fazhan" (Trade and the socio-economic development of Sichuan in the early Qing), in *Sichuan lishi yanjiu wenji* (Collected articles on history of Sichuan), ed., Jia Daquan (Chengdu: Sichuansheng shehui kexuyuan chubanshe, 1987), pp. 186-187; and Peng tonghu, *Sichuan jindai jingjishi* (Economic history of modern Sichuan) (Chengdu: Xi'nan caijing daxue chubanshe, 2000).

study of the silk industry in coastal China, especially in the lower Yangzi delta, suggests that “in Kiangnan sericulture was an ideal subsidiary occupation for the peasant household, but not an ideal primary occupation.”² Inspired by this insightful observation on the relationship between sericulture and the peasant economy, I further argue there was a reinforcing relationship between the subsidiary position of sericulture in Sichuan and the primitive level of sericulture technology.

I first explain how sericulture played a more significant economic role in the hilly regions of Sichuan that possessed relatively lower foodstuff productivity, than in the more fertile alluvial plains. I discuss the range of sericulture techniques the peasants traditionally possessed, and the ecological, economic and technical factors that contributed to the development and adoption of these techniques. The same reasons that sidelined sericulture also restricted the development of sericulture technology, which in turn maintained the subsidiary status of sericulture in the rural economy. In the last section, I analyze the impact of increased market demand on raw silk on rural sericulture in the early twentieth century. While many peasants joined in rearing silkworms, many gave up reeling silk.

Regions of Sericulture Production

With the exception of its remote, humid, and cold mountainous edges, the climate and soil in the entire Sichuan Basin was suitable for sericulture. It was warm and humid, which allowed mulberry trees to sprout early, grow well, and bear green

² Lillian M. Li, *China's Silk Trade*, pp. 148-149.

leaves for long periods. The soil was generally suitable for growing mulberries because of its relatively high fertility. The level alluvial plains had even better soil. The growing of silkworms requires a warm climate and accordingly, the average temperature within the basin is even higher than that in the lower Yangzi delta. In many parts of Sichuan nowadays, silkworms are reared all year round.

However, the agriculture cultivated in the region was not homogenous, but instead, highly diversified. The slightest variance in natural conditions could lead to disparate cropping choices. Human-related factors could lead to even greater diversity in cultivation. As mentioned in chapter 1, the regional division of cash crops and the handicraft industry had been practiced since the eighteenth century. Different districts specialized in one or several kinds of cultivation. Similarly, sericulture, despite being suitable for cultivation almost all over the Sichuan Basin, was primarily concentrated in certain places. Sericulture expert Yin Liangyin listed the major sericulture regions in the Republic of China (see the appendix). There were three leading sericulture regions in Sichuan, centering on Nanchong and Santai in the north, Chongqing in the east, and Leshan in the south of the Sichuan Basin.

It is notable that the hilly areas were the major regions of cocoons and raw silk production. Counties located at the very center of the Chengdu plain in the western bottom of the Sichuan Basin are omitted from the map of sericulture areas. Meishan was the only county on the Chengdu plain where there was significant sericulture, but it was located at the periphery of the Chengdu plain. Mianyang, Leshan and

Jiajiang are conventionally considered as the border section of the Chengdu plain, but substantial hilly areas were actually under their individual jurisdiction. Historically, the Chengdu plain was the center of sericulture and silk trade in China, but it gradually lost its importance in the late imperial period, and ceased to be a sericulture hub during the Republic. The hilly regions overtook the Chengdu plain as the major sericulture center.³ They continued to be the major suppliers of cocoons and raw silk in the People's Republic of China. According to a survey in 1979, the hilly regions contained 80 percent of the mulberry trees in the province.⁴

Ecological reasons and the consequent economic calculation caused the different choices. The Chengdu plain was the most fertile and best-irrigated region of the whole province. Peasants were engaged in multiple cropping and cultivation of high value cash crops. Multiple crop indexes in the plain were the highest within the entire province. Writing in 1928, H. D. Brown and Li Min Liang noted that, "The farming is very intensive throughout the plain and the ground is practically never without a growing crop."⁵ The popular cash crops, such as cotton, tobacco, ramie, hemp, and rapeseeds, brought high economic returns but required intensive labor and highly fertile soil. Peasants were more attracted to the profitable cash crops that could efficiently use up their available land and labor. There was scarce excess labor, capital, and land that could be devoted to sericulture.

³ Guo Shengbo, "Sichuan lishi nongye dili", pp. 363-385.

⁴ Sichuansheng difangzhi bianzhuan weiyuanhui ed. *Sichuan Shengzhi, nongyezhi*, pp. 42-43.

⁵ H. D. Brown and Li Min Liang, "A Survey of 50 farms in the Chengdu Plain, Szechwan", p. 45.

In comparison with the conditions on the alluvial plain, the hilly areas were less advantageous for agriculture, because of the lack of level land, fertile soil, and convenient irrigation. On the land that was not suitable for agricultural farming, the peasants grew economically valuable trees, such as mulberries, wood oil trees, and fruit trees. Therefore, sericulture as a sideline was more significant to rural households in the hilly regions than those in the fertile plains. For example, it was recorded that Langzhong produced only wood oil and raw silk in large amounts, due to the infertile soil.⁶ A more remarkable case was Nanchong, a major cocoon producing district in Sichuan. Geographical conditions and land arability determined the adoption of sericulture. Sericulture was concentrated in the southern and western parts of Nanchong. These areas were primarily made up of uneven dry land which was of low grain productivity but suitable for the cultivation of mulberry trees. The eastern part, however, was fertile and level, which supported many rich peasants who seldom engaged in sericulture.⁷

Furthermore, food productivity in the hilly regions was generally lower than that in the Chengdu plains. Table 1 shows a survey on foodstuff productivity conducted by the Peasant Bank of China in 1941. Productivity in the Chengdu plain was almost equal to that in the lower Yangzi delta. Conversely, the major sericulture centers, Leshan and Nanchong, both produced low outputs of food crops. In Leshan, the yield

⁶ "Langzhong siye gaikuang" (General description of silk industry in Langzhong), *Sichuan yuebao* 9, 4 (October 1936), p. 98.

⁷ Xie cheng and Li Renjie, "Nanchong cansi kaikuang" (General description of silk industry in Nanchong), *Jianshe zhouxun* 10, 23-26 (December 1940): 55-68.

for all food crops, except maize, was lower than the average level in the province. Rice yield in Leshan was only 65 percent of that in Wenjiang in the Chengdu plain, and wheat yield was 46 percent. In Nanchong, the average outputs of all major crops were lower than the provincial average.

TABLE 1 Yield of per mu of rice, wheat, maize, and sweet potato in ten counties in Sichuan, May 1940 – April 1941 (in piculs) ⁸

	Rice (333 farms)	Wheat (334 farms)	Maize (145 farms)	Sweet Potato (200 farms)
Shehong	4.28	0.85	0.80	6.73
Wenjiang	4.09	1.34	1.88	—
Mianyang	3.62	0.83	0.98	3.92
Anxian	3.12	0.92	2.21	3.82
Nanchong	2.87	0.47	0.28	4.06
Baxian	2.77	0.82	—	2.18
Leshan	2.69	0.62	1.33	2.79
Neijiang	2.16	0.52	1.42	3.42
Wanxian	2.07	0.45	0.66	9.33
Yibing	1.82	0.38	—	7.08
Average	2.95	0.72	1.19	4.96

The low productivity of the hilly regions suggests that small peasants had to rely

⁸ Pang Hongsheng, ed., *Zhongguo nongmin yinhang Sichuan nongcun jingji diaocha weiyuanhui diaocha baogao* (Report of the Sichuan rural economy investigation committee of the Peasant Bank of China) (Chongqing, 1941), p. 62.

on their subsidiary occupation more than their counterparts living in the fertile plains. In fact, according to Brown's survey in the 1920s, large family households that only possessed small farms depended heavily on the sale of home-made products on the side, even though they were in the Chengdu plain.⁹ For the rural households in the hilly regions, where ecological and topographical factors inhibited the high-yield crop diversity, sericulture was an ideal sideline. Sericulture made full use of wasted land and demanded intensive labor input in a short period of time, but also generated relatively high profits for the household. As revealed by Philip C. C. Huang, although sericulture did not enable family members to maximize the income they could earn individually, it was a rational way of yielding higher net annual income for the household as a whole.¹⁰ Cocoon production was labor intensive instead of capital intensive. With a few trees, peasants could raise silkworms. It utilized surplus family labor and waste land that would have been unproductive otherwise. Statistical data evince the economic benefits of sericulture. In Junlian from 1898 to 1947, a kilogram of cocoons on average was equivalent in value to 11.25 kilograms of rice.¹¹ A kilogram of cocoons could normally be exchanged for 10.45 kilograms of rice in Jingyan between 1930 and 1936.¹²

⁹ H. D. Brown and Li Minliang, "A Survey of 50 farms in the Chengdu Plain, Szechwan", p. 60.

¹⁰ Philip C. C. Huang, *The Peasant Family and Rural Development in the Yangzi Delta, 1350 – 1988* (Stanford: Stanford University Press, 1990), chapter 5.

¹¹ *Junlian xianzhi* (Junlian county gazetteer), 1948, *juan 1*, cited in Li Zhuxi, Zeng Dejiu, Huang Weihu, eds., *Jindai Sichuan wujia shiliao* (Historical materials of commodity price in modern Sichuan) (Chengdu: Sichuan kexue jishu chubanshe, 1986), pp. 15-18.

¹² Sichuansheng Jingyang xianzhi bianzhuan weiyuanhui, *Jingyan xianzhi* (Jingyan county gazetteer) (Chengdu: Sichuan renmin chubanshe, 1990), p. 219.

Therefore, it is not hard to understand why counties in hilly regions such as Cangxi and Yanting credited sericulture as the most vital component of the peasant economy as early as in the eighteenth century. In Yanting, the popularity of sericulture led to the number of mulberry trees overshadow that of fruit trees and other cash trees, according the Yanting gazetteer compiled in 1763.¹³

The Jingyan gazetteer in 1900 even detailed the significance of silk culture in a peasant economy.

“Raw silk from Jingyan is the most highly valued silk in the Chengdu silk market. Weavers prefer to buy it, and call it *Donglu si* [silk from the eastern road] to distinguish it from those from Jiading, Meishan, Tongchuan, and Mianyang. *Donglu si* is divided into two categories according to thickness. Prices are therefore different. The selling price of thin raw silk is higher than that of thick silk by twenty percent; so is the cost of production. The annual value of raw silk is about several hundred thousand taels. Numerous peasants rely on it for a living. *All expenditure on land tax, land rent, presents and gifts, visit and condolence, debt payment, and rent and hire, often is financed by this cash income called yellow silk cash.* If a poor peasant asks for a loan with a promise of repayment when the yellow silk crop yields, no lender will reject the request. [italics mine]”¹⁴

¹³ *Cangxi xianzhi* (Cangxi county gazetteer), 1783, vol. 2, cited in Wang Di, *Kuachu fengbi de shijie*, p. 149; and *Yanting xianzhi* (Yanting county gazetteer), 1763, vol. 2.

¹⁴ *Jingyan xianzhi*, 1900, juan 8.

The Practice of Sericulture

Sichuan peasants did not utilize the same set of techniques that their counterparts in other sericulture regions in China did, although they shared the understanding of the basic principles and general knowledge pertaining to sericulture. Dieter Kuhn notices that the techniques and terminologies used differed over China, and suggests that human agents rather than the wide range of sericulture manuals were more active in spreading technological innovation in pre-modern China.¹⁵ Just as sericulture practices differed between the Pearl River and the lower Yangzi deltas areas, the practice of sericulture in Sichuan demonstrated many distinct characteristics. In the following discussion, I shall frequently refer to the technology in other sericulture regions for contrast and comparison, so as to identify a distinct set of sericulture techniques in Sichuan.

Mulberry cultivation is the first stage of sericulture. Peasants in the lower Yangzi and South China often designated a portion of their land as mulberry fields. For example, in the Kaixiangong village investigated by sociologist Fei Xiaotong, "Along the margin of each *yu*, ten to thirty meters of land are left for the plantation of mulberry trees, and a wider space for house building."¹⁶ In Wuxi, the sericulture and filature center, about 35 percent of total taxable land was covered by mulberry trees.¹⁷ Uehara estimated that mulberry fields occupied 30 to 40 percent of the

¹⁵ Dieter Kuhn, "Textile Technology", introduction.

¹⁶ Hsiao-Tung, Fei, *Peasant Life in China, A Field Study of Country Life in the Yangtze Valley* (London: Regan Paul, Trench, Trubner & Co., LTD), 1943, p. 155.

¹⁷ D. K. Lieu, *The Silk Industry of China* (Shanghai: Kelly and Walsh, Limited, 1940), p.

arable land in the lower Yangzi.¹⁸ In the Pearl River delta, the silkworm raisers harvested cocoons several times a year, because of the warm temperature and special species of silkworms. The multiple crops year-round supported mulberry cultivation on an even larger scale. For example, Shunde developed a monocrop economy specializing in silk in the late nineteenth century. “In this delta county there are at least 1,000 square miles which are devoted almost entirely to the growing of mulberries. One can travel for a day on a passage boat through the region and see nothing but mulberry fields as far as the eye can reach.”¹⁹ Wang Zhuangmu estimated that from 1916 to 1926, the total area of mulberry plantations in Guangdong Province was 1,800,000 mu.²⁰

Unlike their counterparts in coastal China, peasants in Sichuan hardly reserved any arable land for mulberry cultivation.²¹ It was not until the end of the nineteenth and early twentieth century that mulberry plantations appeared in Sichuan. The rich classes, merchants, and schools invested in these plantations, for educational purpose or for profit from selling mulberry saplings and leaves. Some peasants in

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¹⁸ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan* (A general survey of sericulture in China) (Tokyo: Okada Nichieidō, 1929), p. 76.

¹⁹ C. W. Howard, *The Sericulture Industry of South China* (Canton: Canton Christian Collage, 1923), p. 8, cited in Alvin Y. So, *The South China Silk District*, p. 78.

²⁰ Wang Zhuangmu, *Minguo sichou shi: 1912 – 1949* (History of silk in the Republican China, 1912 – 1949) (Beijing: Zhongguo fangzhi chubanshe, 1996), p. 19.

²¹ Sichuansheng difangzhi bianzhan weiyuanhui, ed., *Sichuan shengzhi, sichouzh* (Sichuan province gazetteer, silk industry) (Chengdu: Sichuan kexue jishu chubanshe, 1998), p. 48; and Sun Zeshu, “Chuansang zhi tezheng jiqi zaifeifa” (Characteristics and cultivation of Sichuan mulberries), *Zhongguo cansi* 1, 7 and 8 (February and March, 1936), p. 25. Sun Zeshu was a modern sericulturist. He was hired by the Sichuan provincial government to spread sericulture in the 1930s. He made reliable observation on Sichuan sericulture practices because of his professional background.

Santai and its nearby region intercropped food crops with mulberry trees, but even this practice was not prevalent in the whole province.²² For the majority of rural households, mulberry cultivation never became their major occupation. They planted mulberry trees on any remaining excess land that did not disturb their main crops, such as on the perimeter of the fields and the corners of courtyards. From the mid-1930s onwards, the Republican government conducted sericulture reform and promotion in the major sericulture regions. A general survey produced after the reform had begun recorded that, on average, in seven sericulture counties in southern Sichuan, there were 91.42 mulberry trees in every household that improved its silkworm raising techniques in spring 1936, 69.7 trees in autumn 1936, 107.02 in spring 1937, and 142.92 in autumn 1937.²³ Taking the estimate of the Xuyong county gazetteer that one mu of mulberry land could accommodate some 300 trees in the early twentieth century, a household utilized at the most only 0.5 mu of land for mulberry cultivation.²⁴ It must be noted that these households were the silkworm raisers in the most important sericulture regions and received special attention from the modern reformers. Other peasant households probably cultivated much fewer trees.

The mulberry trees cultivated were mostly local varieties that were not specially

²² Sun Zeshu, "Chuansang zhi tezheng jiqi zaifeifa", pp. 25-26; and Liu Runtao and Pan Hongsheng, *Sichuan Santai cansi chanxiao zhi yanjiu* (Study on silk production and marketing in Santai, Sichuan) (Jinling daxue nongxueyuan, 1940), p. 15.

²³ Yin Liangying, *Sichuan canye gaijinshi* (History of sericultural reform in Sichuan) (Shanghai: Shangwu yinshuguan, 1947), pp. 235-240.

²⁴ Sichuansheng Xuyong xianzhi bianzhuan weiyuanhui, ed., *Xuyong xianzhi* (Xuyong county gazetteer) (Beijing: Fangzhi chubanshe, 1998), p. 221.

selected or treated to improve their quality. The popular practice of growing mulberry saplings was by seedling, layering, or grafting. In all cases, it took at least three years to nurture saplings.²⁵ Most peasants grew saplings at home. As they were bred domestically, there was no quality management and this led to inferior varieties being bred or inferior silk being produced. Mulberry tree nurseries appeared in the major sericulture centers, such as Leshan and Santai, in the early twentieth century. Some silkworm raisers purchased saplings from these nurseries and transplanted them onto their own land.²⁶

Among all the Chinese peasants who cultivated mulberries, the peasants in Sichuan probably treated their mulberry trees with the least attention. In Zhejiang, Jiangsu, and Guangdong, mulberry lands were regularly tilled, and trees were carefully pruned into short trees. In Sichuan however, peasants often let mulberry trees grow tall without trimming. They hardly devoted special attention to plowing and weeding, only doing so if they were cultivating food crops nearby. When the cocoons and silk market was thriving, peasants might give some extra attention to the mulberry trees. Some would fertilize the soil with manure once a year, and trim branches and twigs in summer and winter.²⁷ Nonetheless, peasants in modern Sichuan were generally lax in their management of their mulberry cultivation. Mulberry leaves developed poorly, and insects and diseases were widely spread.

²⁵ *Minguo xinxiu Hechuan xianzhi* (New Hechuan county gazetteer in the Republic of China) (Chengdu: Bashu shushe, 1992), pp. 1790-1792.

²⁶ Sun Zeshu, "Chuansang zhi tezheng jiqi zaipeifa", p. 25.

²⁷ *Ibid.*, pp. 26-28; Liu Runtao and Pan Hongsheng, *Sichuan Santai cansi chanxiao zhi yanjiu*, p. 15.

Although mulberry leaves were the staple feed of silkworms, silkworm raisers in Sichuan did not only use mulberry leaves, especially in the southern sericulture region. They also fed young silkworms with the leaves of *Cudrania triloba*, a thorny tree called *zhe* in Sichuan. *Cudrania* is easily cultivated and sprouts earlier than mulberry trees. Feeding silkworms *Cudrania* leaves in their early stages allowed mulberry leaves to mature fully. *Cudrania* was widely cultivated and used for feeding young silkworms in southern Sichuan. The proportion of *Cudrania* to mulberry trees was as high as 2 to 1 in the two important sericulture districts of the region.²⁸ Consequently, the majority of silkworms were *Cudrania*-fed. For instance, the total output of cocoons in Jingyan was 189,500 catties in 1949, including 66,300 catties of mulberry cocoons and 123,200 catties of *Cudrania* cocoons.²⁹

Traditional techniques of preparing silkworm eggs were universal in China. The native varieties of silkworm in Sichuan were spring crops. It was common practice for silkworm raisers to select fine cocoons for the breeding of future crops after the harvest. Only a few peasants purchased at the market. In selecting cocoons, the peasants would exercise careful scrutiny, such as examining the appearance and shaking them to hear the sound they made. Selected cocoons were left for the moths to emerge and lay eggs. Only the best and healthiest moths were allowed to mate and to lay eggs on paper or clothes. At this stage, there was neither the use of microscopic analysis nor disease detection in the breeding of native eggs. The

²⁸ Yin Liangying, *Sichuan canye gaijinshi*, p. 139.

²⁹ *Jingyan xianzhi*, 1990, p. 218.

home-made silkworm egg cards were kept for the next silkworm season. During this period, the egg cards were treated several times to eliminate weak eggs with low vitality. The treatments included washing egg cards in salty water or chilling them in cold winter on certain auspicious days of the year.

Spring crop of silkworms hatched out in Sichuan at the time around Qingming Festival in early April, as that was practiced in the lower Yangzi, because this was the time that mulberry leaves sprouted and developed enough. But in southern Sichuan, due to the warm climate, it was also common that peasants started preparing for hatching silkworms in the early March, around the date known as the Awakening of Insects (*Jingzhe*) on the Chinese calendar. To provide a warm environment to help the eggs hatch, Sichuan people used a method similar to that practiced in contemporary France: “for a week or more the pieces of paper containing the eggs would be carried in the bodice of women or in the hat of man.”³⁰ After eight days, the eggs were taken out to enjoy the daylight. At around the time of the vernal equinox (*chunfen*), 21 March, the larvae hatched.³¹

Many peasants did not take care of the silkworms carefully. Silkworm rearing was secondary to agriculture. As the period of rearing silkworms in spring took place concurrently with the busy agrarian season, peasants often could not pay enough

³⁰ The Lyons Chamber of Commerce sent a trade mission to investigate the silk industry of Sichuan from 1895 to 1897. The mission made this observation. See Luce Boulnois, *The Silk Road*, trans., Dennis Chamberlain (New York: E.P. Dutton & Co., Inc. 1966), p. 221.

³¹ Zhang Bixiu, ed., *Leshanshi shizhongqu zhi* (The central district of Leshan city gazetteer) (Chengdu: Bashu shushe, 2003), p. 154.

attention to silkworms. They fed the silkworms irregularly, and without an appropriate amount of mulberries leaves. The result was a long rearing duration before the larvae hatched from their cocoons. The long rearing duration caused silkworms to be more susceptible to diseases and increased risks of death. Insufficient feed also led to the silk fiber of cocoons becoming fragile and short. The hygienic condition of silkworm was problematic too. Peasants did not regularly clear silkworm dung, which caused humidity and the spread of diseases. While clearing dung, they lacked efficient means. They moved silkworms one by one by hand. The procedure was slow and often hurt the fragile silkworms.³²

Silk reeling started after the harvesting and processing of cocoons. The traditional reeling frames were made from bamboo and wood and human-operated. They were called large frame (*dache*) because of their unusual large reels. Although the large frames differed in designs within the province,³³ they were generally simple but efficient and cheap. The large frame with a simple wooden structure was commonly adopted in the countryside. Local carpenters could construct the reeling frames at low cost by using locally available sources. Peasants could easily maintain the devices because of the simple structure. Depending on their reeling skills and the quality of the cocoons, peasants produced raw silk of a wide range of fineness and quality.

In addition, peasants also had a set of practices for communicating with the

³² Liu Runtao and Pan Hongsheng, *Sichuan Santai cansi chanxiao zhi yanjiu*, p.16.

³³ Hosie, *Report by Consul-general Hosie on the Province of Ssuch'uan*, p. 58.

spiritual worlds, which they considered as essential to the production process. This was an indispensable part of the indigenous sericulture practice. Sericulture worship was a nation-wide practice that was sanctioned and encouraged by the Imperial Court. The worship of a variety of sericulture deities was practiced within the imperial palaces, local temples, right down to the individual rural households.

The Chinese rulers had the tradition of holding ceremonies dedicated to patron deities of sericulture. Archeological evidence shows that sacrificial ceremonies were conducted as early as in the Shang Dynasty.³⁴ The empresses led worship towards silkworm deities from the Han dynasty. And Leizu was officially accepted as the deity of sericulture in the Northern Zhou (557 - 581).³⁵ The Qing court revived the practice of empresses officiating national ceremonies for Leizu in the eighteenth century.³⁶

Although Leizu was the official patron goddess of sericulture, there evolved a wide range of regional and local deities. In Sichuan, people worshiped Dark Green Attired God (*Qingyishen*), the Sericulture Goddess (*Cangu*), the Three Sericulture Maidens (*Sanniang*), as well as some other local incarnations.³⁷ Silkworm raisers

³⁴ Hu Houxuan, "Yindai de canshang he sizhi" (Sericulture and silk reeling in the Shang dynasty), *Wenwu*, 11 (1972), p. 5.

³⁵ Wei Zheng et al, *Suishu* (The history of the Sui dynasty), *juan 7*, liyizhi (Taipei: Zhonghua shuju, 1981) vol.1, pp. 145-146.

³⁶ Susan Mann, *Precious Records, Women in China's Long Eighteenth Century* (Stanford: Stanford University, 1997), pp. 152-153.

³⁷ Wei Jie, *Cansang cuibian* (Collection of important essays on sericulture) (1899, Reprint, Beijing: Zhonghua shuju, 1956), *juan 11*, p. 239; *Cansang tushu* (Illustrated description of sericulture), 1895; Sichuansheng difangzhi bianzhuan weiyuanhui, ed., *Sichuan shengzhi, minsuzhi* (Sichuan province gazetteer, Custom) (Chengdu: Sichuan renmin chubanshe, 2000), p. 393; Nanchong cansizhi bianzhuan weiyuanhui, ed., *Nanchong cansizhi* (History of sericulture in Nanchong) (Beijing: Zhongguo jingji

gave offerings to the deities at home and in the temples before they started raising silkworms, and after the harvest of cocoons. Sometimes local communities arranged communal ceremonies. For example, people in Qingshen county believed in the Dark Green Attire God, after whom the county was named. During the Qing dynasty, on the twenty-first day of the first lunar month, the birthday of the Dark Green Attired God, every street had an organization that participated in the procession and festival on that day. Later the festival was replaced with the offering of sacrifices to the deity by local magistrates in the temple. On the twenty-first day of the seventh month, sacrifices were again offered to the deity to offer thanks. Sericulture households all worshiped the deity and attributed the thriving growth of mulberry trees and the high quality of silk to him.³⁸

Worship of sericulture deities, on one side, indicates their anticipation for good harvests; on the other, suggests the worshipers, particularly the silkworm rearing peasants held a fear of unpredictable risk in the process of production and were incapable of prohibiting and explaining these dangers. Prayers, therefore, were an essential means of preventing risks in the rural sericulture.

Apparently, rural households in Sichuan adopted cost-saving strategies in sericulture. Minimum cash capital was dedicated to sericulture production. Family

chubanshe, 1991), pp. 478, 480-481; and Huanghan minsu bianxiezu, ed., *Guanghan minsu* (Custom of Guanghan) (Chengdu: Chengdu keji daxue chubanshe, 1993), p. 152.

³⁸ *Qianlong Qingshen xianzhi* (Qingshen county gazetteer in the Qianlong reign), 1764, *juans* 2 and 6.

land and family labor supplied nearly all the necessary input in many households. Sericulture in rural Sichuan was dominated by the set of age-old and well-used techniques that matched the subsidiary characteristics of sericulture production in the province.

The Logic of Rural Technological Choices

The limited amount of land, the risky nature of sericulture, and the nature of markets all contributed to the peasants' choice of methods in practicing sericulture in Sichuan. First, as I have addressed in the previous chapter, the Sichuan Basin had become an overpopulated region by the nineteenth century. The sizes of farms were limited and continued diminishing. According to the data in two counties in Sichuan, the average crop area per farm kept shrinking from 2.03 acres (12.32 mu) in 1870 to 1.36 acres (8.26 mu) in 1933. It was only slightly larger than that in the lower Yangzi in 1870, but became smaller in the later years.³⁹ Another survey of 1,556 households in the 1930s calculates that about 70 percent of farms were less than 20 mu, and nearly half of the farms were smaller than 10 mu. The majority of small farms were cultivated by tenants. Seventy percent of these tenants cultivated farms that were smaller than 10 mu each.⁴⁰

Peasants usually farmed for subsistence rather than for commercial gain. The majority of their agricultural produce was retained for their family's consumption or

³⁹ John Lossing Buck, *Land Utilization in China*, p. 270.

⁴⁰ Zhang Xiaomei, *Sichuan jingji cankao ziliao*, p. A20.

used to pay their rental or land taxes. As I have showed previously, food productivity was low in the hilly regions. It was difficult for peasants to eke out a living on such small amount of land in the hilly lands of Sichuan, where the land was of lower agricultural productivity and its yield highly reliant on the intensive input of human labor and fertilizer.⁴¹ Even the intercropping of mulberry trees and grains on arable land was not accepted by Sichuan peasants. Only in Santai and its nearby region, one of the largest sericulture centers, did a few farms adopt the intercropping of mulberry and food crops from the early twentieth century onwards,⁴² following the encouragement of a local elite.⁴³

It was not economical to reserve field space for mulberry trees on a small farm. Mulberry trees were hard to cultivate and needed several years of cultivation to become mature enough for feeding silkworms. As Lillian M. Li noted about mulberry cultivation, “Mulberries are difficult to grow to maturity and easily fail. The first year you plant them. Within three years, the fruit will come out. Only six years later do you get a flourishing tree.”⁴⁴ Few peasants could afford to spare a certain amount of land for mulberry trees for several years, and it was highly possible that mulberry trees failed before they matured. For tenants, this was clearly impossible as their tenancy was transferred frequently. They might even terminate their tenancy before the mulberry trees matured. At the same time, rental was as high as 50 percent of

⁴¹ Lü Pingdeng, *Sichuan nongcun jingji*, p. 124.

⁴² Sun Zeshu, “Chuansang zhi tezheng jiqi zaifeifa”, p. 26.

⁴³ Chen Kaizhi, *Binong Zuiyao* (Essential principles for benefiting agriculture) (1897, Reprinted, Beijing: Zhonghua shuju, 1956).

⁴⁴ Lillian M. Li, *China's Silk Trade*, p. 142.

the total income of the rented land. They need to ensure that they cultivated enough to pay off their rent and provide for family consumption.⁴⁵ Mulberry fields were therefore a luxury for those who rented land. Only the well-to-do, primarily local elites of economic, political, or cultural influence, started managing mulberry farms at the beginning of the twentieth century. This will be explored in chapter 4.

The second factor that aggravated the difficulty of expanding mulberry land was the nature of sericulture. Before the second half of the twentieth century, sericulture was a seasonal product. The most common silkworm varieties grew in spring. A few peasants reared a summer crop, but the amount was so little that it was generally neglected. It was only till the 1930s that the government started introducing autumn crops province wide. Only then did double crops of silkworms a year become common. Peasants immediately accepted double crops because of the extra income. Even so, two harvests a year was not enough to stimulate peasants to convert their land into mulberry plantations.

The seasonal nature of sericulture suggests that it should be conducted alongside agriculture rather than as a single crop. The whole process of silkworm rearing from hatching to cocooning is finished within three to five weeks, depending on the silkworm varieties and rearing techniques used. If peasants reared small amounts of silkworms based on their own mulberry leaves, sericulture was an ideal means of utilizing surplus family labor and their spare time. But silkworm rearing was

⁴⁵ Pang Hongsheng, ed., *Zhongguo nongmin yinhang Sichuan nongcun jingji diaochao weiyuanhui diaocha baogao*, vol. 2, p. 16.

labor-intensive. If peasants devoted too much land and labor to sericulture, they would face the problem of having idle labor during long lull seasons, as the manpower would only be needed for the stage of silkworm rearing. Even after the government reformers successfully introduced an autumn crop of silkworms, focusing on two crops that required no more than three months a year was not a sufficient draw for peasants to devote more land to mulberries trees.

Sericulture was also a risky enterprise. Misfortune could happen at any stage of the process and lead to irrecoverable loss. Mulberry tree cultivation failed easily. Even with the help of official instructions and directions from sericulturists, the survival rate of mulberry saplings was only 60 percent in Jiajiang in 1954.⁴⁶ Mulberry leaves were susceptible to insects and diseases, which peasants did not possess efficient means to prevent and control. For example, insects dealt unprecedented damage to mulberry trees in Nanchong, Xichong, Nanbu, and Santai in 1926, and consequently caused the decreased output and diminished quality of cocoons in these regions.⁴⁷ Again, in 1939, 200,000 piculs of mulberry leaves were damaged by insects in Xichong.⁴⁸ The growth of silkworms was full of uncertainty. The domestically bred silkworm eggs were often contaminated by disease. In addition, more silkworm diseases spread in the growing seasons due to changes in weather,

⁴⁶ Jiajiangxian bianshi xiuzhi weiyuanhui, ed., *Jiajiang xianzhi* (Jiajiang county gazetteer) (Chengdu: Sichuan renmin chubanshe, 1989), p. 11.

⁴⁷ Jiang changxu, ed., *Sichuansheng zhi zhuyao wuchan* (Major products of Sichuan province) (Chongqing: Chongqing minsheng shiye gongsi jingji yanjiushi, 1936), p. 16; Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 756.

⁴⁸ Li Zhaoming, *20 shiji Sichuan quan jilu* (Chronicles of the twentieth century Sichuan) (Chengdu: Sichuan renmin chubanshe, 2004), p. 390.

unsanitary conditions, and other factors.

The prices of mulberry leaves, cocoons, and raw silk were unpredictable, which added to the risk of investment. Sometimes silkworm raisers had to rely on the mulberry leaf market for supply of extra leaves. When the price of raw silk was high, cocoons were valuable and more peasants raised silkworms, which increased price of leaves and reduced the profit of selling cocoons. When the price of raw silk was low and the numbers of silkworm raisers lessened, it was not profitable for mulberry cultivators. Thus both mulberry cultivators and silkworm raisers had to control their scale of production to minimize risk.⁴⁹ Most peasants, therefore, raised silkworms through their own mulberry leaves without or with little aid from the market.⁵⁰ At the same time, cocoons perished easily. Producers had to sell fresh cocoons within a certain period before the moths pierced the cocoons to come out; this could result in unfavorable prices. Otherwise, they had to process cocoons by themselves, which did not always ensure the quality of cocoons and also increased production costs. The pattern of mulberry cultivation and silkworm rearing was thus a result of various factors and considerations.

Insignificant Impact of Market on Rural Technology

Sericulture was market-oriented. No peasant produced cocoons or silk for their

⁴⁹ Sichuan gongye kaochatuan, "Sichuan gongye kaikuang" (Profile of industry of Sichuan), *Sichuan yuebao* 11, 5 (November 1947), p. 2.

⁵⁰ Jiang qingxiang and Li shouyao, eds., *Sichuan cansiye* (Sericulture of Sichuan) (Chongqing: Sichuansheng yinhang jinjing yanjiuchu, 1946), p. 96.

own consumption. From the late nineteenth century onwards, peasants and investors became more interested in sericulture, keeping pace with the growing cocoons and raw silk market. To what extent did market forces affect the dynamics of the interacting environmental, economic, social, and technological factors that constrained peasants' choices of sericulture technology between the late nineteenth century and the 1930s?

Cocoons and raw silk served three markets, namely, the non-Western tropical market, the domestic market, and the Western market. The non-Western tropical market demanded silk produced by the indigenous techniques. The people of Burma and India for example preferred silk made from the *Cudrania* silkworms and thick raw silk. Silk pieces woven by this kind of silk was stronger than normal soft silk fabric, and was less sticky on sweaty skin, which makes it more suitable for the tropical climate in India and Burma than mulberry silk. The Burma weaving industry also required coarse raw silk of high thickness. Burmese preferences for thick raw silk did not change even till the end of the 1940s. Fine silk was still unmarketable at the time.⁵¹ Large number of Yunnan merchants was engaged in the export business of coarse silk and *Cudrania* silk.⁵² Due to the continued existence of high demand, there was no requirement for technological improvements.

Local weaving workshops consumed the majority of raw silk produced in

⁵¹ Sichuansheng difangzhi bianzhuanyuanhui, ed., *Sichuan shengzhi, sichouzhi*, p. 264.

⁵² Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 775.

Sichuan. Silk weaving was practiced in many places in Sichuan. Although Chengdu was not on the list of sericulture regions, it was the largest silk weaving center in the province, with the supply of raw silk from other places. The silk pieces of Chengdu were of the highest reputation and the government purchased plenty for the Imperial Court.⁵³ When Nanjing was occupied by the Taiping troops, the Court set up the imperial weaving factory in Chengdu.⁵⁴ There were 2,000 weaving workshops, over 10,000 looms, and 40,000 weavers in Chengdu during the late Qing dynasty. The output accounted for 70 percent of the total output of the province.⁵⁵ The first British consul-general Alexander Hosie also gave similar but more detailed impressions of the prosperous silk weaving industry in Chengdu at the turn of the twentieth century, recounting that “the city contains 6,000 looms, while outside the walls there are as many as 3,400 looms for the manufacture of silk crapes. There are, too, 500 gauze looms in and around the city with numerous ribbon looms, and the weaving of silk braid by hand may be seen in almost every street.”⁵⁶

Leshan was a center for both sericulture and silk weaving in southern Sichuan. Hosie estimated that the Jiading prefecture, with Leshan as the prefectural seat, produced some 6,700 cwts., or about one-sixth of the total raw silk of Sichuan during

⁵³ *Tongzhi chongxiu Chengdu xianzhi* (Revised Chengdu county gazetteer in the Tongzhi reign), 1873, *juan* 2.

⁵⁴ Wei yingtao, Li Youming, and Li Runcang, eds., *Sichuan jindaishi* (History of modern Sichuan) (Chengdu: Sichuansheng shehui kexue yuan chubanshe, 1985), p. 362.

⁵⁵ Liu Jinzao, *Qingchao xu wenxian tongkao* (Continued general study of literary records of the Qing) (1894, reprint, Hangzhou: Zhejiang guji chubanshe, 2000), *juan*. 385, p. 11329.

⁵⁶ Hosie, *On the Trail of the Opium Poppy*, vol. 2, p. 4.

the last years of the Qing dynasty. The market town Suqi near to Leshan contained about 500 looms and there were another about 200 looms in the city of Leshan to serve the silk weaving business at that time. Hosie also met “[a] considerable number of porters with silk goods from Chia-ting Fu [Jiading Prefecture]” on his travel.⁵⁷

Other cities in the province, such as Nanchong, Langzhong, and Chongqing also had silk weaving industries.⁵⁸ In places like Hechuan at the turn of the twentieth century, the local weaving business consumed the majority of raw silk produced locally, and left little amounts of raw silk for the market in Chengdu, and nearly none for other markets.⁵⁹ In Nanchong, the silk center of northern Sichuan, silk pieces were made from local raw materials. These silk goods were sold in the local market, and bore little significance to the export trade.⁶⁰

Throughout the modern Sichuan, the silk weaving industry was dominated by the traditional hand looms. The first semi-mechanized weaving factory was established in 1916, but stopped operation very soon.⁶¹ The first electric power loom was not established until the 1930s.⁶² More power looms appeared during the Second Sino-Japanese War, even though the number of mechanized weaving factories was still limited. At the same time, the silk goods targeted local and regional

⁵⁷ Ibid., vol. 1, pp. 292, 295.

⁵⁸ Hosie, *Report by Consul-general Hosie on the Province of Ssuch'uan*, p. 75.

⁵⁹ *Minguo xinxiu Hechuan xianzhi*, juan 19, p 1787.

⁶⁰ Jiang qingxiang and Li shouyao, eds., *Sichuan cansiye*, p. 66.

⁶¹ Sichuansheng difangzhi bianzhan weiyuanhui, ed., *Sichuan shengzhi, sichouzhi*, p. 166.

⁶² Sichuansheng Jingyang xianzhi bianzhan weiyuanhui, ed., *Jingyan xianzhi*, p. 674.

markets that did not require the improvement of raw materials. Traditionally produced cocoons and raw silk were suitable for the local weaving industry. There was no domestic demand for improved quality silk, hence the impact on the change of rural sericulture techniques was insignificant.

Western demand was the chief stimulator of sericulture production in Sichuan. Sichuan raw silk did not enter the Western market until the middle nineteenth century,⁶³ but it quickly rose as the leading export commodity of Sichuan. Secondary works frequently cite a translated statement that 6,000 piculs of the raw silk were exported to overseas from Sichuan in 1871. Another estimate suggests that 5,000 – 6,000 piculs of Sichuan raw silk were exported to overseas through Shanghai annually from 1851 to 1874.⁶⁴ Better recorded statistical data shows that the Western market did drive substantial increase of Sichuan raw silk export as late as the end of the nineteenth century. Raw silk was the second largest export commodity of Sichuan next to opium in the 1890s. The value of raw silk accounted for 17.13 percent of the total value of all duty-paid goods at the Chongqing customs in 1896, and 18.31 percent in 1897.⁶⁵ In the early twentieth century, the provincial

⁶³ Wang Fangzhong, “1840 – 1894 nianjian waiguo zibenzhuyi qinlue yu zhongguo guonei shichang tongyi qushi de fenjie” (The invasion of imperialism and disintegration of domestic market in China, 1840 – 1894), *Qingshi yanjiuji*, vol.2 (Beijing: Zhongguo renmin daxue chubanshe, 1982), pp. 169-170.

⁶⁴ Sichuansheng difangzhi bianzhan weiyuanhui, ed., *Sichuan shengzhi, sichouzhishi*, p. 217.

⁶⁵ Due to lack of primary sources, I cannot tell when raw silk significantly rose in the export list. But raw silk became one of the most important export commodities as late as 1896 and 1897. See Archibald John Little, *Through the Yang-tse Gorges, or Trade and Travel in Western China* (London: Sampson Low, Marston, Searle, & Rivington, 1888), p. 8.

government actively promoted sericulture in Sichuan, and suppression on opium cultivation further encouraged mulberry cultivation and silkworm rearing (see chapter 3). Raw silk rose as the largest commodity in the export list.

The Western market demanded high quality of raw silk. Its impact on sericulture in Sichuan at the turn of the twentieth century was similar to that in the leather processing industry in colonial India. Leather production boomed because of foreign trade in colonial India, and technological improvement followed but favored mass production. The silk production in Sichuan that oriented to the Western market, similarly, stimulated the adoption of improved silk reeling techniques only in workshops and factories.⁶⁶ The improvement in reeling technology required cash input. This was against the cash-saving logic of small peasants in sericulture production. In contrast, many firms started equipping better reeling devices to produce for Western market from the turn of the twentieth century. Successively, mechanized factories that produced fine silk of standard quality appeared too. More details of these transformations will be discussed in the following chapters.

Petty farmers did not imitate the techniques that manufacture adopted, and many gradually gave up silk reeling at the turn of the twentieth century. The general trend was that peasants gave up on the non-agricultural stage of sericulture as demand for silk and cocoons grew. In other words, the booming raw silk market stimulated by foreign trade started the deskilling of peasants by the turn of the

⁶⁶ Tirthankar Roy, *Traditional Industry in the Economy of Colonial India* (New York: Cambridge University Press, 1999), chapter 6.

Many peasants chose to sell fresh cocoons in the market. Several factors contributed to this decision. The booming of raw silk manufacture created prosperous cocoon market. There were about 2,000 reeling workshops in 1880⁶⁷, and more in the following years. These firms consumed a large amount of cocoons. Cocoon season clashed with busy farming season, when peasants had to be engaged in harvesting wheat and transplanting rice seedlings. Fresh cocoons were perishable. Peasants needed to reel silk before moths pierced cocoons, which meant heavy work in short time. If they decided to process cocoons for future domestic reeling, the treatment was skillful and improper treatment of cocoons could reduce the quality of silk. Therefore, many peasants preferred selling cocoons to domestic reeling. Only when cocoons price was not favorable, they kept cocoons for domestic reeling.⁶⁸

The Republican gazetteers often categorize mulberry cultivation and silkworm rearing as rural production, and silk reeling as industry. For example, the Mianyang gazetteer notes that mulberry cultivation and silkworm rearing were popular in the eastern and northern villages of Mianyang. Women and children took the task of raising silkworms. However, reeling was not part of the rural household business any more.⁶⁹ The Santai gazetteer details the separation of reeling from rural production. Silkworm raisers used to hand-reel silk with large frames in Santai. When more

⁶⁷ Peng Zeyi, ed., *Zhongguo jindai shougongye shi ziliao: 1840 – 1949* (Primary materials of handicraft industry in modern China, 1840 – 1949) (Beijing: Zhonghua shuju, 1962), p. 100; and Wei yingtao, Li Youming, and Li Runcang, eds., *Sichuan jindaishi*, p. 363.

⁶⁸ Zhong Chongmin and Zhu Shouren, *Sichuan cansi canxiao diaocha baogao* (Report on production and marketing of raw silk in Sichuan) (1944), p. 58; Yin Liangyin, *Sichuan canye gaijinshi*, pp. 217-218.

⁶⁹ *Mianyang xianzhi* (Mianyang county gazetteer), 1932, *juan* 3.

efficient reeling frames were introduced into the region, workshops appeared in large numbers. Raw silk produced in the workshops was of better quality and met the market needs. While coarse silk was sold in Chengdu, fine silk were shipped to Shanghai, and then exported overseas. Peasants gave up reeling, and sold cocoons instead.⁷⁰ Nanchong, another leading sericulture center, experienced a similar trajectory.⁷¹

Other than deskilling peasants, the foreign trade brought no significant technological change to the general peasantry. There was not any reform directed or sponsored by the Western silk dealers. In contrast, Western merchants were directly involved in some reformative programs targeted at the stage of rural production in the lower Yangzi and South China from the 1910s. The International Committee for the Improvement of Sericulture (*Zhongguo hezhong cansang gailianghui*) was established in Shanghai in 1917. It was sponsored by French, British, and American merchants in Shanghai, with the participation of the Jiangsu-Zhejiang-Anhui Silk and Cocoon Guild (*Jiangzhewan sijian zonggonghui*). It set up silkworm breeding stations and sericulture instruction offices in the lower Yangzi. These early institutions spread modern technology, especially new silkworm varieties, to rural producers. Similarly, the Guangdong Silk Research Institute (*Guangdongsheng siye yanjiusuo*), and the Guangdong, British, American, French chambers of commerce collectively set up a silk reform committee in Guangdong in 1918. After the committee dissolved in 1919,

⁷⁰ *Santai xianzhi* (Santai county gazetteer), 1931, *juan* 13.

⁷¹ *Minguo xinxiu Nanchong xianzhi* (New Nanchong county gazetteer in the Republic of China), 1929, *juan* 11.

American silk merchants helped the Lingnan Agricultural College carry out sericulture reform.⁷² However, there was no such reform in rural Sichuan at all. Peasants were isolated from the foreign technological improvement directly brought by the Western powers.

The export of raw silk did not push peasants to improve traditional technologies either. It was true that more peasants and more regions were involved in sericulture. Gazetteers such as those belonging to Fushun, Weiyuan, and Suining vividly recorded that sericulture was booming in the early Republic.⁷³ These new participants did not produce cocoons by borrowing new technologies, but followed the traditional method of production. Peasants cultivated mulberries on excess land and reared small amounts of silkworms, in a manner that needed improvement. The traditional ways of production continued well throughout Sichuan in the 1930s. The growth of cocoon output was primarily due to the growth in numbers of participant households, and not increased output per household or per capita.

Conclusion

The confluence of ecological, economic and social constraints shaped how peasants chose and maintained the sericulture technology they used. For the large population of small peasants in Sichuan, sericulture was one of the means of

⁷² C. W. Howard, *Nanzhongguo siye diaochao baogaoshu (The Sericulture Industry of South China)* (Guangzhou: Guangzhou lingnan nongke daxue, 1925), trans. Huang Zepu, p. 5.

⁷³ Peng tonghu, *Sichuan jindai jingjishi*, p. 197.

obtaining secondary income. Sericulture was more important to the peasants in the hilly regions than to those in the fertile plain. Limited land availability and the nature of sericulture restricted the development of sericulture in rural societies. The traditional techniques allowed peasants to practice sericulture with minimum input. Family members supplied the labor. The mulberry trees were planted in limited amounts on extraneous pieces of land that otherwise had little use. Trees received only casual trimming and tilling. Silkworms were often domestically bred and reared, which cost nothing but rendered the silkworms disease prone. Peasants had little knowledge on disease prevention and depended on their luck and prayers to rear silkworms. Their technical deficiencies in turn contributed to the subsidiary nature of sericulture in rural economy.

In fact, the small peasants themselves could not achieve the transformation of their stagnated traditional technology, due to their vulnerable economic and social situation. Market demand, especially that from the West, stimulated the total output cocoons and raw silk, and triggered the expansion of household reeling into workshop manufacture. Small peasants gave up domestic reeling in the face of the more competitive workshops and later, mechanized factories. The Western market did not compensate this deskilling of peasants with any new sericulture skills. It did not bring any direct technological reform; neither was Western influence strong enough to drive small peasants to seek and adopt more productive technology. Western-driven technological modernization in the countryside of inland province was inefficient. The diffusion of sericulture technology had to be more direct.

CHAPTER THREE

The Court and Provincial Government during the New Policy Reforms, 1901 – 1911

In 1900, the Boxer Uprising caused the occupation of Beijing by foreign troops and the flight of the Imperial Court in 1900.¹ During her flight, the Empress Dowager finally admitted that reform was unavoidable and announced an edict in January 1901 calling for reform plans.² This started a decade of aggressive reforms between 1901 and 1911, and led to the eventual collapse of the dynasty as a result of the 1911 Revolution. The series of administrative, economic, educational, military, and constitutional reforms carried out during this decade were called the New Policy (*xinzheng*) reforms.

Many works suggest that the rural communities were the victims of the New Policy reforms. Joseph Esherick argues that, in Hunan-Hubei, the reforms favored urban inhabitants and the rich, while the peasants and the poor paid for the reforms but received little in return. Urban and rural China became polarized and became alienated from each other during this period.³ Agriculture was neglected. “The Confucian attention to agriculture was replaced by the Western fixation on industry

¹ Paul A. Cohen, *History in Three Keys: the Boxers as Event, Experience, and Myth* (New York: Columbia University Press, 1997), part 1.

² Ssu-yü Teng and John King Fairbank, *China's Response to the West: a Documentary Survey, 1839-1923* (Cambridge: Harvard University Press, 1979), p. 196.

³ Joseph W. Esherick, *Reform and Revolution in China: the 1911 Revolution in Hunan and Hubei* (Berkeley: University of California Press, 1976), pp. 106-107, 117-120, 251.

and trade.”⁴ Kristin Stapleton further argues that the reforms were carried out most intensively in the cities, and that the early reform programs had already caused the polarization of the cities and the countryside by the time the constitutional reforms created administrative boundaries between them.⁵ These arguments echoed Philip Kuhn’s view that “Early modernization was a phenomenon of the cities, especially the treaty ports, and left rural China relatively untouched. Centered as it was upon the cities, the modernizing process began to produce a new urban elite that found it increasingly hard to identify itself with the problems of rural China. The gap between modernizing and pre-modern cultures thus tended to become coterminous with the gap between city and countryside.”⁶

The government’s efforts in sericultural improvement in Sichuan demonstrate however that the alienation of the countryside was neither the goal nor the intention of the New Policy reforms. Following the central government’s plans, the provincial governments promoted technological reform in sericulture in Sichuan. Rather than merely promoting industry and commerce, both the central and provincial governments considered rural improvement as an indispensable part of the reforms.

This chapter focuses on the strategies of the central and provincial governments towards developing rural technology as part of the New Policy reforms. The course of

⁴ Ibid., p. 259.

⁵ Kristin Stapleton, *Civilizing Chengdu, Chinese Urban Reform, 1895-1937* (Cambridge and London: published by the Harvard University Asia Center and distributed by Harvard University Press, 2000), pp. 63-64.

⁶ Philip A. Kuhn, *Rebellion and Its Enemies in Late Imperial China: Militarization and Social Structure, 1796 – 1864* (Cambridge: Harvard University Press, 1980), pp. 223-224.

sericulture reform in Sichuan reveals divergence between the Imperial Court and the provincial government on the issue of how to improve agricultural and industrial production. The Court strongly promoted modernization based on Western models and technology, while the provincial government chose to encourage both native and foreign technologies as long as they could increase productivity.

The first section examines two elements of the New Policy reforms that were related to sericulture. On the one hand, the New Policy stressed learning from foreign countries to modernize and westernize Chinese systems and practices; on the other, it granted agriculture, industry, and commerce equal statuses. The New Policy reforms sought to achieve the modernization of these three sectors of the national economy by modeling them after the West and Japan. The second section of this chapter details the Sichuan provincial government's sericulture reform. The provincial government carried out educational programs, implemented taxation relief and rewards, and enacted protectionist regulations for investors and producers. It tried to promote modern technology only within its educational programs, revealing no strong inclinations towards the wholesale adoption of Western technology or practices within other aspects of its reforms.

The Court: Modernizing Economic Enterprises

Throughout the imperial era, rural household based agriculture was the focus of the governments' economic policies, while the imperial ideology considered merchants as harmful, non-productive, and parasitic. Even though merchants had

become a strong force that wielded significant influence in society from the Song dynasty (960-1279) onwards, industry and trade were never officially promoted, guided, and protected by Chinese imperial governments before the late nineteenth century. Mabel Lee argues that the gentry's class disparaged and denigrated the merchant class as a way of maintaining their social status and political power. Merchants thus had to join the gentry group to improve their social status, which actually required them to perpetuate this hierarchy.⁷ The reality of the merchants' growing power and the inter-porosity between the merchant and gentry classes made Wellington K. K. Chan comment that there was "a gap between theory and practice with respect to the merchant's social position."⁸

Researchers such as Dwight H. Perkins, however, argue that the obstacle that restricted the Chinese modernization in the nineteenth century was not Confucian ideology, but the institutional limitations and deficiencies of the central government. It did not possess enough revenue to directly fuel industrialization. It did not provide an efficient modern banking system to help the private sector with capital formation either. There was no modern educational system to facilitate the spread of technological improvement either. The lack of governmental support in the areas of capital formation and technological diffusion exerted a greater impact in retarding

⁷ Mabel Lee, "Wanqing de zhongshang zhuyi" (Mercantilism in the Late Qing), *Jindaishi yanjiusuo jikan* 1, 3 (July 1982), p. 210.

⁸ Wellington K. K. Chan, *Merchants, Mandarins, and Modern Enterprise in Late Ch'ing China* (Cambridge and London: East Asian Research Center, Harvard University, Distributed by Harvard University Press, 1977), p. 25.

the industrialization and modernization of China before the nineteenth century.⁹

Regardless of whether the sluggish modernization and industrialization of China was due to ideological constraints or institutional inadequacies, the onset of the twentieth century was about to change all these factors. The Boxer Uprising and the humiliating flight of the court had convinced all leaders in the Court, including the Empress Dowager Cixi who in 1898 strongly opposed reforms, of the necessity and urgency of all-encompassing transformations. China had to model itself after the foreign countries. The Qing Court consequently made a last-ditch attempt to eliminate all obstacles on China's course to modernization.

During her flight from the occupation of Beijing by the allied foreign forces, the Empress Dowager Cixi finally announced an edict in January 1901 calling on high officials to submit reform plans. The edict declared that: "At the time of reconsolidation, all government affairs require fundamental rectification for the gradual achievement of a strong and wealthy China. The Empress Dowager believes that the weakness of China should be corrected by borrowing the strong points of the foreign countries, and that the lessons from the past can guide us in the future."¹⁰

Answering this call, Huguang Governor-General Zhang Zhidong and Liangjiang

⁹ Dwight H. Perkins, "Government as an Obstacle to Industrialization: The Case of Nineteenth-Century China", *The Journal of Economic History*, 27, 4 (December 1967), pp. 478-492.

¹⁰ Zhongguo renmin daxue qingshi yanjiusuo, ed., *Qingshi biannian* (Chronicles of the Qing dynasty) (Beijing: Zhongguo renmin daxue chubanshe, 1985), vol. 12, p. 239.

Governor-General Liu Kunyi jointly submitted three memorials, after garnering the opinions of the leading merchants and gentry, that were later called the “Three joint memorials for reform by the Huguang and Liangjiang Governor-Generals” (*Jiangchu huizhou sanzhe*), on 12, 19, and 20 July. According to Chinese historian Wu Chunmei, the three memorials formed the first complete reformative plan in modern China and represented the mainstream society’s most profound understanding of reformation in China.¹¹ The throne immediately responded to the memorials and endorsed them as the guiding principle of the New Policy reforms.¹²

Unlike the Self-strengthening Movement that highlighted primarily Western military and defense technologies, the New Policy reforms sought to embrace foreign knowledge in all aspects of society. In the past half century, when China was defeated in the military confrontations with the West, and her economic weakness was revealed by the unfavorable foreign trade balance, a group of officials represented by Governor-Generals Zeng Guofan and Li Hongzhang started establishing modern military and defense enterprises as a means of self-strengthening. This group failed to extend the logic of achieving military superiority to the transformation of the entire Chinese system.¹³

¹¹ Wu Chunmei, *Yici shikong de jindaihua gaige – guanyu qingmo xinzheng de lixing sikao* (A modernization reform out of control, a rational review on the New Policy reforms of the late Qing) (Hefei: Anhui daxue chubanshe, 1998), pp. 57-58.

¹² Zhu Shoupeng, ed., *Guangxuchao donghualu* (Chronicle of the Guangxu reign) (Beijing: Zhonghua shuju, 1984), vol.4, p. 4771.

¹³ Barton C. Hacker, “The Weapons of the West: Military Technology and Modernization in 19th-Century China and Japan”, *Technology and Culture* 18, 1 (January 1977), p. 52.

In contrast, the New Policy reforms “marked a radical departure for the Chinese state, involving a sustained effort to import foreign models and adapt them to Chinese realities.”¹⁴ The three memorials pursued the idea of gradual but fundamental changes of China’s economic, educational, military, legal, and political system. The reforms were modeled after the West and Japan. It was argued that, “adopting the Western system was the strategy for wealth.”¹⁵ The first memorial addressed educational reform, and the second administrative reforms. The third in particular formulated eleven guidelines on learning from foreign countries, including encouraging study overseas, increasing military power, training armies by foreign methods, improving rural production, promoting modern science and technology, implementing modern laws on mining, railways, and commerce, changing the monetary system, rectifying taxation practices, starting a modern postal system, imposing high tariffs on foreign opium, and translating Japanese and Western books. In addition, they appealed to the central government to carry out all these indispensable projects.

One of the significant changes was the equalization of the statuses of agriculture, industry, and commerce. With the administrative reform of the Six Boards, the role of industry and commerce was transformed. In 1903, the Ministry of Commerce was established to take charge of agriculture, industry, mining,

¹⁴ Roger R. Thompson, “The Lessons of Defeat: Transforming the Qing State after the Boxer War”, *Modern Asian Studies*, 37, 4 (October 2003), p. 769.

¹⁵ Wu Chunmei ed., *Jiangchu huizou bianfa sanzhe* (Three memorials of the Liangjiang and Huguang Governor-generals), 2007.

transportation, and finance. Industry and trade, hence, was officially embraced as essential components of the state economy, like agriculture. The Ministry of Commerce was further reorganized as the Ministry of Agriculture, Industry, and Commerce in 1906. From the beginning, the Ministry of Commerce paid equal attention to all economic sectors, as shown by its four departments, namely, the department of Trade, the Department of Agriculture and Forestry, the Department of Industry, and the Department of Auditing.¹⁶

The elevation of the statuses of industry and trade did not mean the degradation of agriculture. The central idea of the economic reforms of the New Policy concentrated not only on industry and commerce, but also on rural production. The translation of the term “*shiyè*” as industry often led to the image that the late Qing government’s economic policies favored industry over agriculture. In fact, the Ministry of Commerce clearly indicated that *shiyè* included all types of economic enterprises such as agriculture, industry, transportation, mining, etc.¹⁷

Ideologically, agrarian production was still considered as “*ben*” (essential). The “*ben*” used here was not the opposite of “*mo*” (inessential), the derogatory term used to characterize industry and commerce in the previous dynasties, but instead meant the first stage of production that industry and commerce depended on. Liu Kunyi and Zhang Zhidong pointed out that, “The way to make people rich and the

¹⁶ For descriptions of each department, see Wellington K. K. Chan, *Merchants, Mandarins, and Modern Enterprise*, p. 165.

¹⁷ Zhu Shoupeng, ed., *Guangxuchao donghualu*, p. 5518.

country affluent is to produce more native goods. If there is no agriculture, there will be no raw materials for industry, and no goods to trade.” The Ministry of Commerce shared the same understanding. According to the memorial it submitted to the throne, “The foundation point of commerce lies in the encouragement of native goods, and commerce is based on industry, and industry is based on agriculture. If agriculture does not develop, the foundation will not be stable, and industry and commerce will have nothing to rely on.”¹⁸ Historian Juan Chung Jen argues that the Ministry of Commerce and its successors between 1903 and 1916 all possessed the idea of the joint-development of agriculture, industry, and commerce.¹⁹

The memorials submitted by Liu Kunyi and Zhang Zhidong called for agricultural modernization and industrialization. On the aspect of agriculture, they argued that farmers followed the local traditions passed down by the older generations without capitalizing on new technology. They suggested four approaches to agricultural reform, all focused on the improvement of agricultural technology. First, the court should encourage students to study new agricultural technology overseas by offering financial support for their studies, and governmental positions after they returned. Second, the provincial governments should circulate agriculture manuals to the local governments. The local governments should instruct local gentry and leaders to try the new technology and new varieties of crops, and then distribute the feasible ones.

¹⁸ Liu Jinzao, *Qingchao xu wenxian tongkao*, p. 11241.

¹⁹ Juan Chung Jen, *Qingmo minchu nonggongshang jigou de sheli, zhengfu yu jingji xiandaihua guanxi zhi jiantao, 1903 – 1916* (Taipei: Institute of History, National Taiwan Normal University, 1988), pp. 116-118, 371-372.

Those who made achievements and contributions should be rewarded. Third, the governments should enlighten and lead the peasantry in the adoption of new varieties, machines, and practices. The provincial governments should establish agriculture schools to conduct experiments. Although the last approach was to enlarge acreage by reclaiming waste land and postponing taxation on reclaimed land, it also provided for the experimentation of the Western agriculture tools and seeds on the waste land.²⁰

Similarly, the policy makers were fully aware that industrialization was critical to the wealth of the nation. "People often argue the wealth of the West was from trade, but do not recognize that their wealth was actually from industry. Trade circulates finished goods. Industry processes unfinished goods, to refine the inferior, to increase the value of the cheap, and to utilize the waste." They were confident in industrialization, "We are not able to rival against the European countries and the United States in terms of trade and commerce. But we absolutely can compete against the other countries through technology." They suggested setting up engineering schools, organizing technology encouragement stations, rewarding skillful technicians, and encouraging and protecting inventions and innovations.²¹

Although the Court did not formulate any specific plan on sericulture, these memorials and the subsequent edicts and reforms unquestionably bore implications for sericulture in paving the way for the modernization of both the agricultural and

²⁰ Wu Chunmei, *Yici shikong de jindaihua gaige*, pp. 50-51.

²¹ *Ibid.*, pp. 51-52.

non-agricultural stages of silk production. Agricultural modernization and industrialization were interwoven and neither should be ignored. First, the agricultural stage of sericulture needed the introduction of new seeds and practices that were primarily borrowed from overseas. Second, the non-agriculture stage of sericulture had become mechanized for greater productivity.

Reform Efforts of the Provincial Government

The reform ideas of the central government depended on a powerful and loyal provincial government to implement and realize. Sichuan was always an important political division of the Qing government. While majority of provinces were under the administration of governors in the Qing dynasty, only Zhili and Sichuan were provinces where the positions of governor were concurrently held by governor-generals, the highest level of regional authority in Qing. Except the Zhili and Sichuan governor-generals, the other governor-generals supervised more than one province.²² In the second half of the nineteenth century, Sichuan was important because it was a support viceroyalty that provided subsidies and revenue to support other regions. In the last decade of the Qing, however, its status in the imperial political map even gradually upgraded to the leading viceroyalty and required outside subsidies and support.²³

²² Chu T'ung-tsu, *Local Government in China under the Ch'ing* (Stanford: Stanford University Press, 1969), p. 5.

²³ S.A.M. Adshead, *Province and Politics in Late Imperial China: Viceregal Government in Szechwan, 1898-1911* (London: Curzon Press, 1984), pp. 45, 74.

The series of Sichuan Governor-Generals during the ten years of New Policy reforms were all politically powerful and administratively capable men. They were Cen Chunxuan (August 1902 – August 1903), Xiliang (1903 – 1907), Zhao Erxun (June 1908 – February 1911), and Zhao Erfeng (March 1907 – June 1908, and February – December 1911). Except for Cen Chunxuan, the rest three were bannermen. These people shared a similar political background. Coming to prominent at the time the Court fled from Beijing when the Allied Forces occupied the city, they were leading imperial political figures who were close to the Empress Dowager Cixi before she died in 1908.²⁴

Cen Chunxuan occupied the relatively insignificant position of Jiangsu's provincial treasurer in 1900 before he took charge of the Empress Dowager's escort, but he became Sichuan's Governor-General in 1902 and achieved fame for his accomplishments in that office. Xiliang was Hunan's provincial treasurer before he was appointed Governor of Shanxi in 1900 to protect the flight of the Court. He was not only trusted by the Empress Dowager, but also connected with influential politicians Zhang Zhidong and Yuan Shikai. Zhao Erxun was once Cen Chunxuan's subordinate. Empress Dowager appointed him as the Sichuan Governor-General in 1907 to balance the power of Han Chinese Cen Chunxuan when the latter held the prominent position of Minister of Postal Services and Communications in 1907. Before Zhao Erxun arrived in Sichuan, his brother Zhao Erfeng was the interim Governor-General. After the death of the Empress Dowager, the Zhao brothers

²⁴ Ibid., *Province and Politics in Late Imperial China*, pp. 37, 44.

continued to be the leading figures of Chinese politics and were accountable only to the throne.²⁵

These Sichuan governors-generals were all interested in reform. Between 1902 and 1911, they imposed numerous duties on local magistrates, concerning law enforcement, economic, judicial, administrative, educational, and other matters.²⁶ Even when the majority of provincial governments were reluctant to organize consultative bureaus (*ziyiju*) because it would increase local power, Zhao actively supported them.²⁷ Sichuan historian He Yimin comments, “The Xinzheng reforms of Sichuan Province were both more rapid and more thorough than other Chinese provinces’.”²⁸

The economic milieu during the late Qing favored sericulture reform. The contagious pebrine disease destroyed European sericulture in the middle nineteenth century. The disease was first discovered in France in the 1840s, and soon spread throughout the Europe in the 1850s and the Middle East in the 1860s.²⁹ French sericulture never fully recovered from the devastation, and had to depend on

²⁵ For the detailed study on the Sichuan governor-generals at the late Qing, see S. A. M. Adshead, *Province and Politics in Late Imperial China*.

²⁶ Kristin Stapleton, “County Administration in Late-Qing Sichuan County Administration in Late-Qing Sichuan: Conflicting Models of Rural Policing”, *Late Imperial China*, 18, 1 (June, 1997), p. 100.

²⁷ Wu Chunmei, *Yici shikong de jindaihua gaige*, p. 179.

²⁸ He Yimin, “Sichuan Province Reforms under Governor-General Xiliang, 1903 – 1907”, in *China, 1895-1912: State-Sponsored Reforms & China's Late-Qing Revolution: Selected Essays from Zhongguo Jindai Shi (Modern Chinese History, 1840-1919)*, ed. and trans. Douglas R. Reynolds (Armonk: M. E. Sharpe, 1995), p. 137.

²⁹ Giovanni Federico, *An Economic History of the Silk Industry, 1830 – 1930* (Cambridge, New York: Cambridge University Press, 1997), p. 38.

imported raw silk to support her still prosperous weaving industry. Later, at the turn of the twentieth century, the United States became another consumer of Chinese raw silk second to France in importance, and it would soon overtake France as the largest importer of Chinese raw silk.³⁰ International demand stimulated production. Exports of all kinds of Chinese raw silk increased from 69,000 piculs in 1871 to 173,000 in 1891, and 216,000 in 1901.³¹ In addition, better raw silk was required by the power-looms that were adopted in the West in the second half of the nineteenth century.³² The Silk Association of America explained to Chinese producers in the 1910s, “the high price of labor and the speed of American machines make the low grade silk more expensive than the higher grades which can be worked with less labor and at a higher speed.”³³ The overseas market for Chinese raw silk could be exploited by expanding silk output, and the improved quality could make it more competitive. Increasing the quantity and quality of raw silk produced relied on sericulture reform.

In Sichuan, the importance of the silk industry was further highlighted by the ban on poppy cultivation. In 1906, the Court pursued its determination to suppress

³⁰ Lillian M. Li, *China's Silk Trade*, pp. 81-83; Xu Xinwu, ed., *Zhongguo jindai saosi gongyeshi* (History of mechanized silk reeling industry of modern China) (Shanghai: Shanghai renmin chubanshe, 1990), pp. 105-106; Tomoko Shiroyama, *China during the Great Depression*, p. 52.

³¹ Hsiao Liang-lin, *China's Foreign Trade Statistics, 1864 – 1949* (Cambridge: published by East Asian Research Center, Harvard University, Distributed by Harvard University Press, 1974), pp. 109-110.

³² Giovanni Federico, *An Economic History of the Silk Industry*, p. 57.

³³ SAA, *China and Canton Raw Silks* (New York: Silk Association of America, 1916), p. 6, cited in Giovanni Federico, *An Economic History of the Silk Industry*, p. 57.

opium. It ordered the complete eradication of opium in China within ten years with an eleven-article program.³⁴ The Sichuan government implemented penal taxation on opium and tightly controlled the production, distribution and consumption of opium. After Zhao Erxun assumed the position of governor-general in 1908, opium suppression was even more intensive. In August 1909, Zhao ordered to completely root out the cultivation of opium in the coming season, and he firmly carried out this plan.³⁵ The success of opium eradication was recorded in both Western and Chinese sources. Alexander Hosie made a special trip to investigate the impact of the Qing's government policy on opium. His personal observation and the testimony of the others revealed that poppy cultivation was suppressed in Sichuan in 1910.³⁶ The local gazetteers of Wanyuan, Changshou, Luxian, Fengdu, Huayang counties also noted that poppy cultivation was nearly wiped out at that time.³⁷

Opium was the most important commodity to Sichuan's economy, not only to the government, but also to the farmers. Poppy could generate for the peasants more cash income than food crops. Hosie estimated that an acre of poppy field yielded raw dry opium worth £5.16s.8d in contrast to £4.5s.6d for an equivalent yield

³⁴ For the English version of the edict, see Hosie, *On the Trail of the Opium Poppy* vol.2, pp. 193-204.

³⁵ S.A.M. Adshead, *Province and Politics in Late Imperial China*, p. 91.

³⁶ Hosie, *On the Trail of the Opium Poppy*, vol. 2, pp. 268-272.

³⁷ Wanyuan xianzhi (Wanyuan county gazetteer), 1932, *juan* 3; Changshou xianzhi (Changshou county gazetteer), 1944, *juan* 3; Luxianzhi (Luxian county gazetteer), 1938, *juan* 3; Chongxiu fengdu xianzhi (Revised Fengdu county gazetteer), 1927, *juan* 9; Huayang xianzhi (Huayan county gazetteer), 1934, *juan* 33. All cited in Dai Angang, ed., *Zhongguo difangzhi jingji ziliao huibian*, pp. 1212-1213.

of wheat.³⁸ The suppression of poppy cultivation threatened rural livelihood. In some regions, such as in Changshou, poppy cultivators resisted the ban and the prefectural government had to send troops to suppress the unrest.³⁹

Opium formed the lion share of Sichuan exports from the late nineteenth century onwards. For instance, in 1896, 936,667 lbs. of Sichuan produced opium passed the Chongqing maritime customs, and it constituted 26.90 percent of the total value of exports from Chongqing. The numbers even increased to 1,252,266 lbs. and 30.60 percent in the next year.⁴⁰ These numbers did not include the large amount of opium that did not pass through the maritime customs. The governmental policy of eliminating opium, undoubtedly, was a blow to the Sichuan economy and trade balance.

The Sichuan government had to find substitutes for opium in order to maintain economic and social stability. The best possible substitute was sericulture products. Next to opium, sericulture goods, including raw silk, cocoons, and silk refuse, was second in importance in terms of the value of exports from Chongqing.⁴¹ There was much potential for generating wealth from sericulture and the silk industry. For instance, Guang'an was not famous for silk before the twentieth century. The suppression of opium forced the peasants to switch from poppy cultivation to

³⁸ Hosie, *Report by Consul-general Hosie on the Province of Ssuch'uan*, p. 27.

³⁹ Hosie, *On the Trail of the Opium Poppy*, vol. 2, p. 267.

⁴⁰ Archibald John Little, *Through the Yang-tse Gorges*, p. 8.

⁴¹ *Ibid.*

mulberry cultivation to seek income from sericulture.⁴² At the same time, sericulture promotion had long been a traditional task of the Chinese bureaucracy. E-Tu Zen Sun suggests that “the promotion of sericulture had worked itself into the administrative ethos of the traditional culture, and had come to be regarded as a part of the government’s duties in the realm of public administration.”⁴³ This legacy well continued in the early twentieth century.

The provincial government’s concern with the promotion of sericulture started with institutional change at the provincial level. The Bureau of Commerce, the provincial representative of the Ministry of Commerce, first set up a pilot silk reeling workshop for the transmission of improved reeling technique in the provincial capital, Chengdu, in 1903. This government-owned Model Silk Reeling Workshop used wooden hand-operated re-reeling frames to produce raw silk for export. At the same time, an official of the Bureau of Industry bought back a reeling device from Japan.⁴⁴ Following the New Policy’s agricultural reform plan, the provincial government established the Bureau of Agriculture in 1905. The Bureau of Agriculture supervised farming, sericulture, forestation, and animal husbandry. It set up commodity exhibition halls, organized fairs, and published agricultural manuals.⁴⁵ In 1906, the government started providing short-term sericulture education program, and the

⁴² Zhou Jianhou, “Guang’anxian wuchanzhi” (Products of Guang’an county), *Shunong jikan* 3 (May 1936), p. 32.

⁴³ E-Tu Zen Sun, “Sericulture and Silk Textile Production in Ch’ing China”, in *Economic Organization in Chinese Society*, ed., W. E. Willmott (Stanford, Stanford University Press, 1972), p. 82.

⁴⁴ Li Zhaoming, *20 shiji Sichuan quan jilu*, p. 35.

⁴⁵ Wang Di, *Kuachu fengbi de shijie*, pp. 165-167.

Sichuan Provincial Agricultural School (*Sichuan tongsheng nongzheng xuetaang*) was established, with a department of sericulture providing a three-year education program.⁴⁶ If “[g]overnment policy maker seemed not to realized that a modern silk industry would require fundamental institutional changes” at the end of the nineteenth century,⁴⁷ the situation in Sichuan was clearly changing from the beginning of the twentieth century.

Meanwhile, local officials undertook various means of promoting sericulture, but the technologies employed in these sericulture promotional programs at the local level were inconsequential. The Yanting magistrate compiled a manual on sericulture in 1904. The Yilong government distributed copies of a sericulture manual to sericulture districts. In 1905, Pixian planted over 10,000 mulberry trees on city walls. In 1906, Anxian set up a special office to disseminate agricultural and sericultural technologies.⁴⁸ These local official endeavors were still dispersed and uncoordinated before 1907. Like their pre-twentieth-century predecessors, they reflected neither significant innovation in sericulture knowledge, nor centralized and systematic diffusion methods. They encouraged primarily the age-old practices.

However, the arbitrary promotion of sericulture at the local level was replaced by more systematic and intensive programs that were enforced province-wide after

⁴⁶ Li Zhaoming, *20 shiji Sichuan quan jilu*, pp. 59-60. The school was soon renamed as Sichuan Secondary Agricultural School (*Sichuan zhongdeng nongye xuetaang*). For the convenience of description, I still address it as the Sichuan Provincial Agricultural School.

⁴⁷ E-Tu Zen Sun, “Sericulture and Silk Textile Production in Ch’ing China”, p. 108.

⁴⁸ Li Zhaoming, *20 shiji Sichuan quan jilu*, pp. 43, 44, 46, 60.

1907, when Zhou Shanpei assumed the post of Intendant for the Encouragement of Enterprise (*Quanyedao*) in Sichuan. He was the representative of the Ministry of Agriculture, Industry, and Commerce at the provincial level. Although the Intendants could contact the Court directly, bypassing the provincial government, they were tightly controlled by the provincial governors and governor-generals. Their promotion highly depended on the recommendations of the latter and they were officially the latter's subordinates. Before Zhou took this position, he had made his fame through reforming the police, and managing the provincial bureau of commerce, mining, and industry. He worked hand in hand with the governor-generals in following the instructions from the central government. He was confident of his contributions in reforming silk, cotton, sugar, tea production, and promoting the introduction of steamers for transportation in Sichuan. "Regarding anything that is essential to the long-term benefit of Sichuan, did I not plan, or not do my best to realize the blueprint?"⁴⁹

Zhou was familiar with sericulture, as a native in Zhejiang, a sericulture province in the lower Yangzi. Backed by the provincial government, he carried out a number of reforms and promotion projects on the silk industry in Sichuan. He took personal charge of the Provincial Sericulture Bureau. The provincial bureau had four departments, each respectively responsible for supervising sericulture promotion, silkworm rearing, mulberry cultivation, and silk reeling. The provincial bureau

⁴⁹ Zhou Kaiqing ed., *Sichuan yu xinhai geming* (Sichuan and the 1911 Revolution) (Taipei: Taiwan xuesheng shuju, 1976), p. 192.

managed technological invention and improvement. It hired professionals from the Zhejiang Sericulture School (*Zhejiang canxueguan*) in Hangzhou in the lower Yangzi delta. The Zhejiang Sericulture School was the first sericulture school and trained the first generation of modern sericulturists in China. Many sericulturists and new silkworm varieties in Sichuan came from the school. For example, Zheng Kai and Zhou Jixian, the heads in charge of silkworm breeding and mulberry cultivation were both from the school.

The professionals from the Zhejiang Sericulture School took charge of technological improvements in Chengdu. They imported new silkworm varieties, such as those named as Zhugui, Xinyuan, and Xinchang, from the lower Yangzi. These varieties yielded white cocoons that were different from the leading native varieties that produced yellow silk in Sichuan. In addition to raising silkworms in spring, they began rearing summer crops of silkworm. They also bought in the *hu* mulberry and *lu* mulberry, the species of mulberries that yielded high quality of leaves in the lower Yangzi and were different from those cultivated in Sichuan. Furthermore, they introduced framed egg cards for the moths to lay their eggs individually and separately on paper- or cloth- made cards. This started the adoption of framed egg cards in the province.⁵⁰

The local offices were responsible for technological diffusion. The provincial government specified achievements in developing sericulture and the silk industry as

⁵⁰ Yin Liangying, *Sichuan canye gaijinshi*, pp. 23-24.

one important criterion for the evaluation of the performances of magistrates on prefectural and county levels. It required every major silk producing county and prefecture to establish specific offices to take charge of sericulture and the silk industry.⁵¹ The order from Chengdu pushed the local magistrates to found, from 1908, sericulture promotion centers in all the regions that were suitable for sericulture. These centers were primarily educational institutions providing advanced or elementary programs. The advanced programs required students to study more than three semesters, while students in elementary programs graduate after two semesters. The governmental promotion was particularly active after 1909. By September 1909, 17 counties had set up centers of advanced program, another 52 offered elementary programs, and three had both advanced and elementary programs. In total, 3,400 students were enrolled in these centers.⁵² By 1911, more than 130 promotion centers had been founded within the province, with 4,200 students in total.⁵³ In addition, there were even special programs targeted at women and monks. In 1910, a women's sericulture training center was set up in Chengdu. It recruited 80 women.⁵⁴ Training programs for Buddhist monks in the provincial sericulture promotion center in 1910 and 1911.⁵⁵

⁵¹ Ibid.

⁵² Chen Yuanhui ed., *Zhongguo jindai jiaoyushi ziliao huibian: shiye jiaoyu shifan jiaoyu* (Compiled primary materials on the modern education in China: vocational education and teachers' education) (Shanghai: Shanghai jiaoyu chubanshe, 2007), p. 105.

⁵³ *Zhengzhi guanbao* (Government news), issue 1229 (4 April 1911 [the sixth day of the third month of the third year of Xuantong reign]) (Taipei: Wenhai chubanshe), vol. 43, pp. 121-122.

⁵⁴ Wang Di, *Kuachu fengbi de shijie*, p. 172.

⁵⁵ Baxian, 6 – 54 – 01562.

These modern sericulture promotion centers primarily taught modern sericulture knowledge. The teachers were mainly graduates from modern sericulture institutes. They diffused the knowledge that they learned in the modern sericulture schools. For example, Cheng Timing, a graduate of the department of sericulture at the Provincial Agricultural School, was in charge of the sericulture promotion center of Jingyan. The curriculum he offered included mulberry cultivation, silkworm rearing, silk reeling, the pathology, physiology, and anatomy of silkworms, the use of microscopes, silkworm egg production, and the examination of silkworm egg, cocoon, and raw silk, etc.⁵⁶ Subjects like pathology or physiology was completely new knowledge that was never previously available in the traditional sericulture manuals and practices.

However, the level of modern technological improvement should not be overstated. According to a Japanese investigation in 1926, the sericulture schools continued rearing Zhugui and Xinyuan silkworms, which, unfortunately, did not produce high quality cocoons. These silkworm species probably had degenerated by the time. The *lu* mulberries were widely cultivated in Baoning prefecture in northern Sichuan, but the *hu* mulberry was too expensive to become prevalent anywhere in the province. Although the framed egg cards were produced in many places in Sichuan in the mid-1920s, the majority of farmers continued to use the traditional means of producing silkworm eggs.⁵⁷ The bivoltine summer crop of silkworm only

⁵⁶ Jingyanxian zhengxie wenshi ziliao weiyuanhui, ed., *Jingyan cansi yitiaolong* (Vertically integrated sericulture production in Jingyan) (Jingyan: 1995), pp. 10, 22.

⁵⁷ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, pp. 754-755, 757.

spread into a few localities, and its output was nearly negligible.

While setting up public sericulture institutes, the provincial and local governments strongly supported private efforts. First, the governmental officials were willing to grant private sericulture societies that aimed at increasing sericulture productivity legal status. For instance, the first sericulture society in Sichuan received support from the magistrates of Jingyan, Hezhou, and Jiangjin, at a time when the public sericulture institutes had not appeared yet.⁵⁸ When more sericulture societies were established in the later years, the officials welcomed them with complimentary comments such as “it is a blessing to the future of local sericulture;” “industry is the urgent task.”⁵⁹

Second, the government provided private mulberry plantations with legal and institutional protection. The traditional practice of sericulture did not produce mulberry plantations in the countryside. But some well-to-do people started exploring the possibility of achieving economies of scale in mulberry cultivation from the late Qing dynasty. The appearance of the private mulberry plantation, which attained economies of scale was a great piece of progress in sericulture in Sichuan. Most private mulberry plantations were started on rented land. After the crops began to yield, disputes about land rent were common because of the imperfect contracts. Landlords either increased land rental, or threatened to terminate tenancy. The provincial government looked at these cases as an obstacle to sericulture

⁵⁸ *Nongxuebao* (Journal of Agriculture) 170 (1902).

⁵⁹ Baxian, 6 – 54 – 01557 and 6 – 54 – 01559.

development, and issued four rules.

1. If the land is rented for mulberry cultivation, but tenancy is not specified in the contract, the land is considered as being under permanent tenancy and the lender shall not terminate the lease.
2. If the land has been rented over five years, the lender can increase rent, but shall not increase the required deposit. The total increased amount of rent shall not be more than 20 percent of the initial rent.
3. Tenant shall not cut down mulberry trees after their tenancy terminates.
4. If the mulberry plantation is reclaimed wasteland, the lender shall never increase rent.⁶⁰

The official encouragement of silk production was two-fold. The provincial and local governments encouraged and protected the agricultural stage of sericulture on the one hand, and advocated high quality raw silk production and export on the other. They recognized that raw silk would be the major source of generating foreign exchange, and hence paid great attention on producing raw silk for export purpose. According to one account, Zhou Shanpei arranged a meeting of the leaders of the Sichuan silk industry, soon after he assumed the position of Intendant. In this meeting, he praised the establishment of the first steam filature in Sichuan and strongly advocated raw silk export. He claimed, "It will be a shame if Sichuan silk is

⁶⁰ Baxian, 6 – 54 – 01555.

not seen in the New World.”⁶¹

The Intendant office and the related institutions implemented supportive policies and regulations to encourage silk improvement for the overseas market. In the spring of 1910, Zhou contracted a Shanghai silk dealer to help market “improved” Sichuan raw silk to foreign silk dealers. The improved silk (*gailiangsi*) was produced by both the improved non-mechanized reeling devices and by mechanized steam filatures. It was finer than the hand-reeled domestic silk (*tusi*) reeled by the large frames. The Intendant office collected and sent the improved raw silk to Shanghai for export through contracted Shanghai silk dealers.⁶² Furthermore, for facilitating improved raw silk export, Zhou enacted the “Regulation for Pledging Improved Raw Silk” in 1910. According to this regulation, holders who had difficulties exporting over 800 liang of raw silk could put their silk in pledge for loans from the silk guilds in Chengdu, Chongqing, and Tongchuan. The Intendant office took the responsibility of sending samples to silk guilds for quality examination. The loan was 80 percent of the current price of native silk at the interest rate of one percent per month. The guilds then sent the pledged silk to Shanghai to sell. After deducting regular operational cost, loan, and interest, the income was returned to the commissioner without any commission.⁶³ This was a rather favorable regulation for raw silk producers.

Tax reduction was the most significant and attractive policy that the government

⁶¹ Zhong Likan, “‘Binongsi’ de xingshuai” (The rise and fall of raw silk of the Binong Filature), *Sichuan wenshi ziliao xuanji* 44 (1995), p. 81.

⁶² Baxian, 6 – 54 – 01341.

⁶³ Baxian, 6 – 54 – 01358.

offered to silk producers who could produce fine silk. Researchers such as S.A.M. Adshead, Stephen R. Mackinnon, and Kristin Staple often stress that the heavy taxes for government modernization projects jeopardized the interests of the local merchants.⁶⁴ Although the argument was verified by a variety of cases, it neglects to consider the possibility that the imperial government could reduce taxation to favor the producers and merchants under certain conditions, such as the case in silk industry in Sichuan.

In Sichuan, a regulation in effect from the early 1910 exempted improved silk that qualified for export through Shanghai from a *lijin* levy. The local offices for the encouragement of industry were responsible for examining raw silk and offering *lijin* exemption tickets. The positions of raw silk examiners, Silk Examination Committee Members, as they were called, were normally assigned to the teachers in local sericulture promotion centers, for they were usually the professional sericulturists among the local government officials. According to the revised regulations promulgated in 1911, the procedure was quite strict. The examination criteria included fineness, evenness, breakage, and color. Examiners were required to finish their examination within one day, and the offices should return the examination results within three days. No delay was allowed. The regulations also quite efficiently prevented malpractice. Three copies of examination results were made. One was issued to the silk owners, one kept by the offices, and the last one submitted to the

⁶⁴ S.A.M. Adshead, *Province and Politics in Late Imperial China*; Kristin Stapleton, *Civilizing Chengdu*, p. 161.

Intendant with the examined sample. Examiners were held accountable for the results.⁶⁵ When the silk was transferred through Chongqing, it would be reexamined by the Chongqing silk guild again.⁶⁶ This method ensured the rights of raw silk exporters as well as the quality of export raw silk.

Raw silk that qualified was issued with *lijin* exemption tickets. The exemption duration was the time needed for its transportation from the place of departure to the Chongqing Maritime Customs, assuming that the shipment took two days to travel fifty kilometers. During this period, the qualified silk would not be levied any *lijin* when it passed *lijin* stations.⁶⁷ For instance, if the distance from the producing district to Chongqing was 500 kilometers, the producers of the qualified silk did not have to pay *lijin* for 20 days when they shipped the silk to Chongqing. By 1910, the major silk markets, Chongqing, Chengdu, Leshan, Santai, and Guang'an, all had examiners to examine raw silk for export.⁶⁸ It was estimated that this policy could save silk exporters 2.6 to 3.6 taels for every picul of raw silk.⁶⁹ In addition to *lijin* exemption, the Provincial Sericulture Bureau awarded producers seven taels for every picul of qualified raw silk exported to Shanghai.⁷⁰

Tax deduction and cash rewards were attractive policies for those who invested in improved raw silk production, especially the steam filatures that could produce

⁶⁵ Baxian, 6 – 54 – 01353.

⁶⁶ Baxian, 6 – 54 – 01348.

⁶⁷ Baxian, 6 – 54 – 01353.

⁶⁸ Baxian, 6 – 54 – 01348.

⁶⁹ Baxian, 6 – 54 – 01341.

⁷⁰ Sichuan shengsichou gongsi, ed., *Sichuan sichou shiliao* (Chengdu: n.d.), Section 3, Chapter 4, part 2.

fine silk of standard and high quality. On the one hand, improved fine silk was about 580 to 600 taels a picul, double the price of coarse domestic silk reeled using pre-modern methods.⁷¹ On the other, improved silk enjoyed *lijin* exemption and financial rewards that domestic silk could not acquire. The attractive returns stimulated improved raw silk production in Sichuan during the very last years of the imperial China.

The reform endeavors of the provincial and local governments on sericulture in Sichuan, in fact, focused on the improvement of quality and quantity rather than the adoption of particular foreign technology. Only the public education section placed emphasis on modern sericulture technologies in their curriculum. It taught new means of producing and examining silkworm eggs, and spread foreign knowledge on silkworms and diseases. Government policy and taxation support, however, did not show such strong preference for foreign technology. It protected private mulberry plantations which could use any kind of technology to cultivate mulberries. It encouraged superior quality raw silk through taxation policies and financial rewards, without specifying that the improved raw silk should only be produced in modern mechanized factories.

Conclusion

The New Policy reforms during the last years of the Qing dynasty were designed

⁷¹ According to the Chongqing Silk Guild, the best domestic raw silk was worth 389 taels per 1,000 liang in 1908. There was not any mechanized raw silk to export through Chongqing that year. See Baxian, 6 – 7 – 1364.

to transform every aspect of the empire by borrowing and adopting Western and Japanese institutions and knowledge. The central government legalized the equal position of agriculture, industry, and commerce, and pursued their development without bias. It heralded reforms that planned to realize agricultural modernization and industrialization.

The Sichuan provincial government reinterpreted the decrees from the central government to suit regional condition, especially in the case of sericulture. It paid close attention to sericulture reform because of the increasing importance of silk as a source of livelihood for the people and export revenue for the province. At the provincial level, it initiated technological reform, introduced new technology and varieties of mulberry trees and silkworms, set up provincial schools for technological research and the training of experts, and offered political and financial support to stimulate technological improvement. It further stimulated technological diffusion at the prefectural and county levels by tying officials' promotion with their prefectures and counties' performance in sericulture.

Both the central government and provincial government took the peasantry into their consideration in planning and implementing the New Policy Reforms. Governments from the provincial level down to the county seat encouraged both agricultural and non-agricultural stages of sericulture production. It was impossible to develop the non-agricultural sector only, as the production of raw silk was dependent on the agricultural stages of sericulture. In fact, this work will reveal that

it is impractical to distinguish between the rural and the urban in sericulture throughout modern Sichuan. For the agrarian-based industry, no real success in the industrial sector could be achieved without improvements at the agricultural stages.

In terms of diffusing knowledge and skills in sericulture, the provincial government did not specially stress on foreign technology, as planned by the Court. The provincial government was flexible with the improvements in sericulture. It introduced foreign technological reforms at the agricultural stages by setting up institutes and hiring experts to impart foreign knowledge. In contrast, it did not intervene in the industrial stage of silk reeling, except to exert financial and political influence on the producers. It delineated no clear modernization agenda on raw silk manufacturing. The vague term “improved raw silk” was used to describe both mechanized and non-mechanized raw silk, as long as it was better than the traditionally reeled coarse silk.

CHAPTER FOUR

Private Participation in Rural and Industrial Production, 1901 – 1911

In Meiji Japan, the “literate landlord-businessman-experimenter” led the way in developing sericulture, boosted by favorable international demand and government encouragement. Richard J. Smethurst enumerates a long list of well-to-do landlords who participated in the improvement of sericulture technology in Yamanashi in Japan. These landlords were interested in sericulture reform, and had both time and capital to invest in its pursuit. They became leaders in technological innovation and diffusion. They conducted experiments and promoted new technology through demonstrations before the turn of the twentieth century, when more and more tenants also became literate and could read and learn from publications.¹

The economic and political environments in Sichuan in the early twentieth century bore many similarities to the conditions that stimulated the Meiji sericulture reform. There was escalating international demand for raw silk and cocoons. The imperial government eradicated the cultural and ideological bias against industry and trade. During the closing years of the Qing dynasty, the central and provincial governments, and local society achieved a consensus on the desirability of transforming China. Like their Meiji counterparts, the well-to-do classes in Sichuan became active champions and actors in sericulture reform.

¹ Richard J. Smethurst, *Agricultural Development and Tenancy Disputes in Japan, 1870 – 1940* (Princeton: Princeton University Press, 1986).

The involvement of the educated well-to-do classes implies that civil society functioned in spreading new technology in late Qing Sichuan. Instead of confronting the Manchu government, these elites acted as the government's collaborators, stimulated by economic gains and their social obligations. They made more significant and direct contributions to technological innovation and diffusion than the government had at the time. They were the innovators, advocates, and testers of the new technologies. They hoped to attain both personal profits and serve societal interests through technological improvement. Supported and protected by the provincial and local authorities, these private players participated in rural production by setting up a large number of sericulture societies, as well as boosted the industrial sector by establishing factories to produce improved raw silk. Commercialization and industrialization did not divorce the rich from rural production, but created a new link between them. The rich did not only prefer safe land investment, but were also ready to invest large capital in risky businesses that might not generate quick return.

This chapter first discusses how private agents joined the sericulture reform movement during the closing years of the Qing. Many participants were educated and were often interested in promoting education and in saving the province through economic development. Chen Wanxi (Chen Kaizhi), the most successful sericulture entrepreneur in Sichuan, presents an interesting case study. In promoting technological diffusion, Chen was influenced by both his Confucian background and nationalism. However, an evaluation of Chen's sericulture manuals proves that he continued to utilize traditional practices at the agricultural stage of sericulture

although he did not reject modern mechanization in the non-agricultural sectors.

Booming Private Sericultural Societies

Private efforts at modernizing sericulture technology started long before the central government decided to implement the New Policy reforms. For example, Jardine, Matheson & Co. established the Ewo Filature in Shanghai in 1861, while Chinese merchants began investing in filatures from 1881 in Shanghai. With the appearance of large number of private Chinese steam filatures in Shanghai and Guangdong, filature silk overtook domestic hand-reeled raw silk as the top exported silk commodity from 1898 onwards.² The first private Chinese sericulture school was set up in Hangzhou in 1897. The *Nongxue bao* (Journal of agriculture), the first journal of its kind, was also founded in 1897. The journal frequently translated and published the latest news and discoveries in sericulture.

Sichuan was a late comer in sericulture modernization, in comparison with coastal China. The gentry-literati in Sichuan did not actively participate in sericulture reform and promotion until the twentieth century, when the development of sericulture in Japan and other regions of China caught the attention of Sichuan's educated populace. They were also concerned with China's continued weakness on the international stage. As the leaders of local society, they believed that they should take up the task of saving the nation through economic enterprises. The Boxer

² Chen Ciyu, *Jindai zhongguo de jixie saosi gongye* (The silk industry of modern China, 1860 – 1945) (Taipei: Institute of Modern History, Academia Sinica, 1989), pp. 16, 27.

Uprising was the trigger that convinced both the imperial Court and the most stubborn conservatives that reform was vital and urgent. Furthermore, the commitment of the Court towards reform stimulated “immense voluntary, non-government effort” in local society, which was “the most striking feature” of the New Policy reform movement.³ This was vividly underscored by the private involvement in sericulture in Sichuan.

The Sichuan Sericulture Society (*Sichuan cansang gongshe*) that combined educational programs and business was the first sericultural enterprise in twentieth century Sichuan. It was initiated by Shi Xie, an official of the Qing government and a native in the Sichuan sericulture region. When Shi was assigned to a post in Hubei province, he passed over the plan to Zhang Senkai, who realized it in 1903.

Zhang Senkai was the chairman of the Sichuan Sericulture Society. He was a non-official scholar at the time he took over Shi’s responsibilities. In fact, he was more renowned as a historian than as a sericulture reformer later. He held the *juren* degree as he had passed the imperial examination at the provincial level in 1893. He started paying attention to sericulture reform when he was sojourning in Shanghai in 1894. According to his own account, he was disappointed by the low price of Sichuan raw silk in the Shanghai market, and began reading the articles on sericulture in the *Nongxue bao* from 1897. The humiliation of the Boxer Uprising and the flight of the

³ Jack Gray, *Rebellions and Revolutions, China from the 1800s to the 1980s* (Oxford: Oxford University Press, 1990), p. 140.

Court stimulated him to initiate reform for economic competitiveness.⁴

The Sichuan Sericulture Society at first hoped to receive help from the Japanese consulate in Chongqing. Chongqing was opened as a treaty port in 1891. Subsequently, the Treaty of Shimonoseki signed after the first Sino-Japanese War granted Japan the right to set up a consulate in the Chinese treaty port. Hence, a Japanese consulate was set up in Chongqing in 1896. Before he transferred his plan to Zhang, Shi Xie had contacted the Japanese consulate on the issue of sericulture reform. He planned to invite Japanese sericulturists to teach people in Sichuan “Japanese and Western sericulture.”⁵

However, Japanese influence actually had little impact on the establishment of the society. Instead, the work was carried out completely by the Chinese elites. Financial difficulties prohibited Sichuan elites from direct contact with Japanese sericulturists, who by the time had developed a set of knowledge based on laboratory tests and scientific principles. Relying on his own influence, Zhang solicited help from the local society. The members and investors of the Sichuan Sericulture Society included influential gentry bearing imperial titles and governmental positions from all over Sichuan. They provided strong support for Zhang to realize his plan.

The sericulture reforms the society pursued were very much alike those

⁴ *Minguo xinxiu hechuan xianzhi*, pp. 1830 -1831.

⁵ *Ibid.*, p. 1831.

conducted by the Provincial Sericultural Bureau a few years later. The society hired Chinese sericulturists from the Zhejiang Sericulture School. It introduced silkworm varieties called Xinyuan and Zhugui varieties. These varieties spun white silk that was popular in the western market. It also tried to promote silkworm varieties that could be cropped in summer, imported saplings of the *hu* mulberry breed from the lower Yangzi, taught students to produce framed silkworm egg cards, and emphasized the disinfection of sericulture equipment.⁶

Through providing education, the Sichuan Sericulture Society made major achievements in technological diffusion. In 1903, the society was registered as the Private Vocational Middle School (*Minli sheye xuetang*). It was the first vocational school for sericulture in Sichuan, as well as one of the few early sericulture schools in China. By 1910, the school had trained over 110 students. 28 graduates were also sent to Japan to study by the society. The rest went to the other districts of the province to spread sericulture and reeling skills.⁷

Although the Sichuan Sericulture Society appeared before the beginning of official support, sericultural societies did not bloom until the Intendant for the Encouragement of Enterprise was set up in Sichuan after 1907. As discussed in chapter 3, government policies offered protection and financial awards to the participants while international demand for raw silk made the reform profitable. As a result, the well-to-do people in the regions that were suitable for sericulture invested

⁶ Ibid., pp. 1789, 1801, 1830, 1883.

⁷ Li Zhaoming, *20 shiji Sichuan quan jilu*, p.18.

in sericultural societies. For example, in late 1908, sericultural societies began to rise in Nanchuan, Shehong, and Yizhou.⁸ The number of private sericultural societies peaked in 1909 and 1910. According to Baxian archival documents, at least five sericultural societies were established, or applied to be set up, in Baxian between October 1909 and May 1910.⁹ In mid-1911, even Buddhist temples and monasteries organized sericultural societies and appealed to the government for recognition and protection.¹⁰ The Baxian gazetteer describes how government encouragement resulted in the prosperity of private planters, “sericultural societies appeared in great numbers. ... Paddy fields that yielded 100 shi of rice were turned into mulberry lands.”¹¹ The “100 shi of rice” is probably approximate number or an exaggeration. But considering that 4.4 shi of rice per mu was the average output in Sichuan in the Qing¹², this line does suggest the local interests in mulberry cultivation.

The existing documents reveal that many societies sought to maximize profits through utilizing improved techniques and benefits from the economy of scale. They specialized in mulberry cultivation, silkworms rearing, silkworm eggs breeding, and raw silk reeling. Silkworm eggs, and mulberry saplings and leaves especially, were the major sources of their profit. The majority of funding received was spent on renting

⁸ *Chengdu ribao* (Chengdu daily) (the 27th days of the 10th month, 1908, and 29th day of the 11th month in Chinese calendar), 1908.

⁹ Baxian, 6 – 54 – 01557, 6 – 54 – 01558, 6 – 54 – 01559, and 6 – 54 – 01560.

¹⁰ Baxian, 6 – 54 – 01566.

¹¹ *Minguo baxianzhi* (Republican Baxian county gazetteer), 1939, *juan* 11.

¹² Zhou Bangjun, “Qingdai Sichuan liangshi muchan yu nongye laodong shengchanlü yanjiu” (Rice yield per mu and agricultural labor productivity in Qing Sichuan), *Zhongguo nongshi* 23, 3(2005), p. 63.

land and purchasing mulberry. For instance, in Baxian, the Yichuan Sericulture Society bought 50,000 mulberry saplings, the Dexin Sericulture Society purchased over 80,000, and the Yuxi Sericulture Society even cultivated 100,000 saplings.¹³ Such large-scale cultivation correspondingly required large amounts of land in the countryside. It was not rare to see societies owning over one hundred mu of mulberry plantations. Therefore, investment in sericultural societies was great. Some societies had initial investments of over 10,000 taels.¹⁴

Madeleine Zelin has noticed that the merchants in Sichuan were adventurous entrepreneurs who could take on high-cost and high-risk businesses, as in the case of salt well drilling.¹⁵ In their eagerness to advance sericulture, the well-to-do in Sichuan were similarly committed to the long-term investment in sericultural societies. The large amount of investment in production processes, especially on mulberry cultivation, could not generate returns in a short time. In comparison with other commodities such as foodstuff crops, rapeseeds, and cotton, sericulture was much more risky. Unpredictable weather conditions, pests, diseases, and market fluctuation could easily destroy the efforts of previous years. These obstacles, which impeded small-holders and peasants from investment in sericulture, did not stop the well-to-do.

The investors included students of modern or foreign learning, Confucian

¹³ Baxian, 6 – 54 – 01557, and 6 – 54 – 01559.

¹⁴ Baxian, 6 – 54 – 01557.

¹⁵ Madeleine Zelin, *The Merchants of Zigong, Industrial Entrepreneurship in Early Modern China* (New York, Colombia University Press, 2005).

scholars with imperial examination degrees, government position holders, merchants, Buddhist monks, etc. They were primarily the educated richer classes of the local society who could afford the large and long-term investment. More importantly, they were confident in that they could reduce the risk by adopting new technology. Even if they did not know modern techniques, they were able to learn these or to hire experts. In fact, some societies were even organized by Japan- or locally-trained modern sericulturists. These people possessed both knowledge and capital. They could afford to wait to reap long-term returns. In the meantime, their knowledge could reduce the risk that small farmers would face. Once successful, the economies of scale would result in a dramatic increase in productivity.

It is notable that despite their profit-maximization agenda, many sericultural societies were modeled after the Sichuan Sericulture Society. They provided education or training programs, and carried out technological research. Some well-organized societies even provided quite advanced levels of education. One founder of the Sichuan Sericulture Society, Shi Xie, returned back to his native prefecture Jiading and raised 4,000 taels from the local elites to establish another sericulture society. This society invited a Japanese expert to teach modern sericulture.¹⁶

Thus, the booming of sericultural societies in Sichuan challenged the idea that commercialization encouraged landlords to become disconnected from production,

¹⁶ Jingyanxian zhengxie wenshi ziliao weiyuanhui, ed., *Jingyan cansi yitiaolong*, p. 8.

as Joseph Esherick once suggested.¹⁷ Instead of divorcing themselves from production, the well-to-do actively participated in the sericultural societies amidst the increasing commercialization of sericulture. They established partnerships and pooled their capital to support rural production. The participants were different from either absentee landlords or managerial landlords. One of the most significant changes they brought to Sichuan was private mulberry plantations, which was not possible for small peasant households.

Furthermore, these rich investors did not monopolize the new technology that they used to gain profit. The private sericultural societies often offered educational programs that could attract more participants. The well-to-do were not merely absent landowners, but practiced, taught and improved mulberry cultivation as well as pursued other technological improvements related to rural stages of sericulture.

However, technological achievements for the agricultural stage of sericulture were limited. Except for the promotion of new mulberry varieties, few new techniques were used in the cultivation of mulberry plantations. Instead, the methods used were already available in the traditional sericultural manuals. The societies merely practiced them in a manner that was more systematic and leveraged on the economies of scale. In terms of silkworm rearing, since they could not efficiently resolve the problem of silkworm diseases, no significant progress was possible. For example, the Sichuan Sericulture Society had only the capacity to

¹⁷ Joseph Esherick, *Reform and Revolution in China*, p. 67.

produce over 4,000 disease-free silkworm egg cards by 1908.¹⁸

Furthermore, as revealed by the Sichuan Sericulture Society, the application of modern techniques was constricted by prevailing circumstances. The disease-free silkworm eggs were essential to the growth of silkworm and yield of cocoons. Microscopes were required to detect disease-contaminated silkworm eggs. Microscopes were so expensive at that time that a chief technician left the society and took away a microscope as collateral for his unpaid salary. It was impossible for petty producers to acquire microscopes. The society therefore had to promote the traditional methods of selecting silkworm eggs through observing their shape, size and color using the human eye. Similarly, the methods of mulberry cultivation and insect prevention treatment that Zhang Senkai recorded in his book resembled traditional methods that were recorded in traditional Chinese sericulture manuals.¹⁹

Technological Improvement in Silk Reeling

Technological change in silk reeling was more significant than in mulberry cultivation and silkworm rearing during the closing years of the Qing. The technological changes were primarily carried out by private individuals and agencies, while the government offered little direct intervention besides policy support and economic incentives. The private individuals and agencies adopted two strategies towards the reform of silk reeling. They either improved the human-operated reeling

¹⁸ *Minguo xinxiu hechuan xianzhi*, p. 1836.

¹⁹ *Ibid.*, pp. 1835, 1789-1796.

frame or chose to use the western machines that were powered by steam engines.

By the late Qing, the disadvantages of indigenous reeling devices had alarmed people in Sichuan. The traditional large frame was the most popular reeling devices in Sichuan in the nineteenth century. The device had appeared in the Song dynasty.²⁰ There was no technological improvement in the reeling device used in Sichuan from the Song dynasty to the late Qing. This traditional reeling technique produced coarse raw silk of low quality. Alexander Hosie had lamented the primitiveness of the reeling techniques in Sichuan.²¹ Zhang Senkai, similarly, complained that the traditional reeling produced only coarse and uneven silk that was worth less than half of the value of filature silk in the lower Yangzi.²² But they differed in their proposals of the technologies that could improve silk quality. Hosie suggested adopting the “foreign reeling plant”, while Zhang and his Sichuan Sericulture Society was dedicated to adapting traditional techniques to the new requirements without necessarily embracing mechanization.

One of the most significant innovations in reeling technology in Sichuan at the turn of the twentieth century was the appearance of new reeling device called small frame (*xiaoche*), as an adaptation to local condition. The small frame had smaller reels, in comparison with the traditional large frame. It was superior to the large frame, in producing better quality of raw silk. This innovation was a local innovation

²⁰ Dieter Kuhn, “Textile Technology”, p. 389.

²¹ Hosie, *Report by Consul-general Hosie on the Province of Ssuch'uan*, p. 60.

²² *Minguo xinxiu hechuan xianzhi*, p. 1848.

brought on by the interior location of Sichuan. It was hard to introduce mechanized reeling equipment into Sichuan due to the difficulty of transportation. For instance, the Chongqing Silk Guild transported reeling machine components from Yichang to Leshan in 1910. The cargo weighed 97,314 catties. It took seven days to disembark the cargo, and one boatman nearly drowned while unloading the goods.²³ Therefore, the locals invented the small frame by imitating after the modern machines in the filatures. The small frame had a similar structure to the mechanized reeling machines, but was not machined and rather supplied by human power.²⁴

A technique of re-reeling raw silk spread widely too. The Sichuan Sericulture Society was an active advocate of the raw silk re-reeling technique. The Society cooperated with the local elites to establish the re-reeling Jingwei Silk Workshop in 1908, and Huigong Silk Workshop in 1911.²⁵ The re-reeling approach spun raw silk thread a second time so that it could minimize the rough addition of extra filaments, which resulted in coarseness and unevenness. The whole process depended on nimble human fingers, without any additional element of mechanization. According to Dieter Kuhn, the re-reeling technique had been widely known in Zhili, Jiangsu, Zhejiang, and Sichuan in the nineteenth century.²⁶ However, the practice did not become popular in Hechuan until the twentieth century, and Hechuan became one

²³ Baxian, 6 – 54 – 01373.

²⁴ Xu Xinwu, *Zhongguo jindai saosi gongyeshi* (History of mechanized silk reeling industry of modern China) (Shanghai: Shanghai renmin chubanshe, 1990), p. 248.

²⁵ Wang Di, *Kuachu fengbi de shijie*, p. 338. Chen Ciyu, *Jindai zhongguo de jixie saosi gongye*, p. 208.

²⁶ Dieter Kuhn, “Textile Technology”, p. 175.

of the leading regions for the production of re-reeled silk in the first half of the century.²⁷ Zhang proudly proclaimed that the prosperity of raw silk re-reeling in Hezhou resulted from the leadership of the re-reeling workshop of the Sichuan Sericulture Society.²⁸

Furthermore, the Sichuan Sericulture Society further improved the small frame. In 1907, a student invented a hand-operated multiple-reel frame (*renli liandong zhisiche*). It tied several small reels together, which could be run at the same time using a hand-operated crank. The hand-operated multiple-reel frame increased productivity. This technology was later widely adopted by the reeling workshops that used small frames.²⁹

Meanwhile, mechanized steam filatures appeared in Sichuan, despite the difficulty of transporting machines from outside of the province. The profits from filature silk, the favorable government policy, and growing international demand stimulated the appearance of steam filatures in Sichuan. At least six filatures were set up during this decade, namely, the Binong Filature in 1908³⁰, Shumei Filature in

²⁷ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 775.

²⁸ *Minguo xinxiu hechuan xianzhi*, p. 1926.

²⁹ Sichuansheng difangzhi bianzhuān weiyuanhui, ed., *Sichuan shengzhi, sichouzhi*, p. 133.

³⁰ The Binong started silk reeling production by using non-mechanized reeling devices in 1902, but soon developed into mechanized production. Most sources suggest that the Binong transformed into filature and started mechanized production in 1908. See Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 774; and Gao Peixun, Liu Hangchen, Lu Zuofu, and Huang Mianzhan, “Sichuan cansiye gailiang chubu jingguo baogao” (Report on the first stage of reforming sericulture in Sichuan), *Sichuan Shanhou duban gongshu tuchang gaijing weiyuanhui yuekan* 1, 1 (1934), p. 67.

1908, Yongjinxiang Filature in 1908, Xudong Filature (later renamed Tianfu) in 1910, Chengcheng Filature in 1910, and Bichuan Filature in 1911.

The output of filature raw silk kept increasing in the last years of the Qing, following the growth of filatures. The export of Sichuan filature silk was first mentioned in the Returns of Trade and Trade Reports in 1909. But filature silk probably had been already sold in Shanghai before. According to the Baxian archival documents, the Yongjinxiang Filature started producing filature raw silk in Santai as early as 1908. Its filature silk was sold at the price of about 550 teals per picul in Shanghai that year.³¹ In 1912, the first year of the new Republic, 1,247 piculs of yellow filature silk and 67 piculs of white filature silk were exported through the Chongqing customs.³²

Unlike the silk industry centers in Shanghai, Wuxi, and Guangdong, where filatures were introduced by Westerners, compradors, or merchants with overseas economic connections, the early establishment of filatures in Sichuan reveals the active participation of educated members of local society. The largest and earliest steam filature in the province was set up by an ex-private teacher and *xiucai* degree holder, Chen Wanxi. Chen also established another filature in Leshan in 1913. The Shumei Filature was established in 1908 by Shi Qingyang. Shi was a *xiucai* before he went to Japan to study sericulture and joined in Sun Yat-sen's Revolutionary Alliance in Japan in 1906. He was an active supporter of sericulture and established a

³¹ Baxian, 6 – 54 – 01374.

³² China Maritime Customs, *Returns of Trade and Trade Reports*, 1914, pp. 874, 878.

sericulture society. A local biography eulogized him as having “spent the whole fortune of his family to set up the filature.” Later, Wen Yousong took over the Shumei Filature and merged it with another filature to form the Xudong Filature. Wen was also a *xiuca*i degree holder and private teacher in Chongqing. He was close to the Japanese and opened schools named as *kaizhi* (enlightenment).³³

It is safe to argue that both moral and financial reasons motivated the educated well-to-do to invest in improved factories. As businessmen, these innovators and investors pursued high economic returns. Improved raw silk fetched a higher market price than non-filature and non-re-reeled domestic raw silk produced by the traditional large frames. The improved raw silk sold at 580 to 600 taels per picul, while the non-filature and non-re-reeled silk was at 270 to 300 taels per picul at the time.³⁴

At the same time, their background as educators and scholars pushed them to extol the virtues of cherishing the people and saving China from foreign economic encroachment. However, they often identified China with the Sichuan province alone. For example, Zhang Senkai was ashamed by the fact that Sichuan raw silk fetched the lowest price in the Shanghai market and hoped to reform sericulture in Sichuan.³⁵ Chen Wanxi expected his sericultural practices to be diffused to “the whole Sichuan

³³ Sichuansheng difangzhi bianzhuan weiyuanhui, ed., *Sichuan shengzhi, renwuzhi* (Sichuan province gazetteer, People) (Chengdu: Sichuan renmin chubanshe, 2001), p. 392.

³⁴ Baxian, 6 – 54 – 01341.

³⁵ *Minguo xinxiu Hechuan xianzhi*, p. 1788.

population and the whole Sichuan province”.³⁶ When Yongjingxiang Filature was forced to closed down in 1909, the Intendant Zhou Shanpei suggested the local society to take over it because the “silk industry is critical to the whole province.”³⁷ A proposal to establish a First Sichuan Sericulture Co. Ltd. recommended that the government offer it protection because silk brought tremendous and long lasting benefit to the economy of Sichuan.³⁸ The students who had studied in Japan suggested that people encouraged one another to improve silk quality in Sichuan, for the purpose of recovering Chinese rights and interest.³⁹ The larger theme of saving the nation and national economy was actually submerged beneath a regionalist outlook centered on Sichuan.

In the late Qing promotion of the silk industry, the provincial government and local well-to-do classes were engaged in reciprocal collaboration. The government created an ideal environment for the introduction and utilization of new technology. Local people especially the educated elites responded to the policies actively and positively. Many silk producers equipped improved indigenous devices or even modern machines, and directly benefited from the government’s promotional policies. On the one hand, participation in the silk industry was accompanied and supported by government policies. On the other, it allowed them to fulfill their social

³⁶ Chen Kaizhi, *Quansangshuo* (Encouragement of mulberry cultivation), n.p. & n.d., p. 1.

³⁷ Baxian, 6 – 54 – 01374.

³⁸ *Sichuan Jiadingfu wengao* (Documents of Jiading Prefecture, Sichuan) (Beijing: Quanguo tushuguan wenxian suowei fuzhi zhongxin, 2005)), vol. 3, p. 961. There was no evidence that this company was ever eventually established.

³⁹ *Sichuan* (The Sze-Chuen Magazine) 3(1908), p. 148.

roles and responsibilities while reaping lucrative returns. Therefore, the local elites cooperated with the local and provincial governments in promoting sericulture.

Chen Wanxi: A Confucian Entrepreneur

Chen Wanxi was the most prominent and successful silk entrepreneur in Sichuan in the early twentieth century. His career in sericulture started in the late nineteenth century. By the time the new Republic had replaced the Chinese imperial system, he had made his major contributions in the technological innovation of sericulture. He was more a representative of the traditional scholars than modern radical reformers. Therefore I categorize him as the representative of the elite advocates during the late Qing, despite the continued prosperity of his business until the mid-1920s.

This section examines how Chen's status as a Confucian-entrepreneur influenced his technological contributions. Chen had been a village Confucian teacher before he and his family accumulated wealth through sericulture from the late nineteenth century onwards, and set up the first steam filature in Sichuan. Strongly influenced by Confucian ideals, he actively promoted the development of sericulture and silk industry across the whole province. However, the sericultural manuals he composed reveal that he primarily relied on indigenous understandings in the agricultural stage of sericulture. The sources used in this section are biographies written by Chen's contemporaries, oral history compiled at the end of the twentieth century, and my interview with Chen's grandson, Chen Gangzu. Chen

Wanxi himself composed three sericultural manuals, two of which remain in existence, allowing the examination of his Confucian beliefs and moral values, as well as his sericultural knowledge.

Chen Wanxi was born in a village near Santai in northern Sichuan in 1855. The family of seven people, including four younger sons born later, had only a piece of land covering 1.7 mu to farm.⁴⁰ It was impossible for a family to survive on this amount of land, but no other source material reveals what kind of sideline his family depended on. Despite his family's poverty, Chen was sent to study under the village's private teacher. His classmate described him as the best student in the class.⁴¹ He passed the *imperial* examination at the county level and acquired the *xiucai* degree in 1871.⁴² Then he worked as a private school teacher in the village temple, at the same time preparing to sit for higher level examinations. However, he would fail the examinations several times in the following years.⁴³ Without a higher degree and large plot of land, Chen could barely support his family with his income as a village teacher. It was probably the desperation of poverty and the lack of success in the imperial examinations that stimulated his decision to effect change. An account records his lament that, "With neither success in learning Confucian classics nor skill

⁴⁰ Zhong Likan, "'Binongsi' de xingshuai", p. 79; Chen Gangzu, "Cheng Kaizhi yu binong sichang" (Chen Wanxi and the Binong Filature), *Santai wenshi ziliao xuanji*, vol. 1, p. 37.

⁴¹ Chen Kaizhi, *Binong zuiyao*, p. 1; Chen Gangzu, "Cheng Kaizhi yu binong sichang", p. 37.

⁴² Zhong Likan, "'Binongsi' de xingshuai", p. 79.

⁴³ Feng Deliang and Leshanshi zhengxie wenshizu, "Leshan huaxin sichang xingshuaiji" (The rise and fall of the Huaxin Filature in Leshan), *Sichaun wenshi ziliao xuanji*. 32 (1984), p. 33.

for self-sufficiency, I am a lazy vagrant.”⁴⁴

Chen was inspired by the monks of the village temple where he taught students. The monks made profits by selling the leaves of the temple’s mulberry trees every year. The profit from the mulberry trees during one cocoon season was greater than his annual teaching allowance. It seems that sericulture was only the resort of the impoverished in Santai in the nineteenth century. The social status of silkworm raisers was lower than that of farmers. Chen recalled that his family members obstructed his plan of converting arable land for a mulberry plantation, because only the desperately impoverished people practiced sericulture and none prospered from it. Various sources record that Chen’s decision was also ridiculed by his village at the time.⁴⁵

Nevertheless, Chen convinced his brothers to start planting mulberry in 1877. They intercropped mulberry trees and other foodstuff crops in the family field, and also planted mulberry on other possible land corners. With the increased output of mulberry leaves, they expanded from raising three trays of silkworms to 21 trays in a few years. They reeled raw silk at home by using simple large frames that were widely adopted in rural Sichuan.⁴⁶

⁴⁴ Zhang Binglin, *Taiyan wenlu xubian* (Continued collection of essays by Zhang Binglin) (Taipei: Xinxing shuju, 1956), p. 26.

⁴⁵ Chen Kaizhi, *Quansangshuo*, p. 20; Zhang Binglin, *Taiyan wenlu xubian*, p. 26; Zhao Xi, *Wanxisou zhuan* (Biography of Chen Wanxi), n.p. and n.d.

⁴⁶ Zhong Likan, “‘Binongsi’ de xingshuai”, pp. 79-80; and Chen Gangzu, “Cheng Kaizhi yu binong sichang”, pp. 37-38.

The Chens accumulated wealth quickly. Later, they rented land to plant mulberry trees.⁴⁷ One source claims that they rented mulberry plantations as large as 500 mu.⁴⁸ Another estimated that 100,000 mulberry trees in total were planted in the plantation.⁴⁹ The preface of Chen's *Quansangshuo* (Encouragement of mulberry cultivation) records that in the 1910s, the Chens harvested over 200,000 catties of mulberry leaves, and over 100 piculs of fresh cocoons.⁵⁰

Chen Wanxi visited steam filatures in Guangdong at the end of the 1890s, and he was duly impressed by the advanced machines and steam boilers. He borrowed money from the parents of a student that he taught, and established a reeling factory in 1902. It was named as Binong (literally, benefit agriculture). The factory started reeling raw silk by 12 small frames. The filature compound was completely finished in 1905, with five buildings, including shopfloors, warehouse, and dormitories.⁵¹ The filature continued increasing the number of reeling machines boasted of 320 machines in total in the republic era.⁵² Its scale was a marvel, and its advancement was outstanding in Sichuan at the beginning of the twentieth century.

It was recorded that Chen controlled the filature strictly. He visited the shopfloors every day. If he saw anything wrong, he stopped the operation to give a

⁴⁷ Zhao Xi, *Wanxisou zhuan* (Biography of Chen Wanxi), n. p. & n. d.

⁴⁸ Zhang Binglin, *Taiyan wenlu xubian*, p. 26.

⁴⁹ Li Zhaoming, *20 shiji Sichuan quan jilu*, p. 76.

⁵⁰ Chen Kaizhi, *Quansangshuo*, p. 1.

⁵¹ Zhong Likan, "'Binongsi' de xingshuai", p. 80; Yin Liangying, *Sichuan canye gaijinshi*, p. 346.

⁵² Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 774.

lecture immediately. There were also scheduled lectures too: to the administrative staff on the dates ending with one, three, and five every month; to the cocoon peeling workshop on the dates ending with two, four, and eight; and to the reeling workshop on the dates ending with three, six, and nine.⁵³

Santai in northern Sichuan, where Chen made his fortune, was not suitable for the further expansion of the silk industry due to the lack of fuel. From the 1910s, Chen gradually transferred the center of his silk business to Leshan in southern Sichuan. Leshan was more advantageous than Santai because of the long sericultural tradition, convenient water transportation, and easy access to the coal market. Chen established the Huaxing Filature, originally named Jiaxiang Filature in Leshan in 1913. The filature was located outside the city wall of Leshan county. It began with capital of 20,000 taels, a much grander starting point than the Binong filature. In the beginning, there were 120 mechanized reeling machines and over 200 workers. By 1927, the filature had developed into a prosperous one, with 360 reeling machines and about 1,000 workers. The Chens made huge profits not only as producers of raw silk, but also as dealers for other filatures.⁵⁴

Because of his fame in the silk industry, Chen was appointed to some government positions, such as Sericulture Advisor of Sichuan Province, Head of the Bureau of Sericulture of Santai county, and Head of the Industry Bureau of Sichuan

⁵³ Yin Liangying, *Sichuan canye gaijinshi*, p. 22.

⁵⁴ Feng Deliang and Leshanshi zhengxie wenshizu, "Leshan huaxin sichang xingshuaiji", pp. 35-36.

Province. The Chens also managed good relationships with local civil, and especially, military governments. Chen Wanxi and other influential local people helped the Leshan military authorities to build the first public park in Leshan. When he died in 1926, his funeral procession was escorted by local military leaders and their troops.⁵⁵

Confucian motivation and knowledge sharing

Chen's writing reflects his strong desire to save China, especially Sichuan, through economic activities. He argued that sericulture was a means of relieving the country and people from impoverishment. The benefit from improved sericulture could revise the unbalanced international trade record that allowed outsiders to exploit the Chinese population and China's wealth. Like most of the contemporaneous Sichuan sericulture promoters however, his mind was focused on Sichuan alone. He concerned on modeling Sichuan after the lower Yangzi delta in terms of the latter's sericulture economy and technology.⁵⁶ The couplets he posted on the gates of his filatures further demonstrate his ambitions for Sichuan. The couplets on both sides of the gate of the Binong Filature read, "Borrowing 400,000 copper cashes, start Sichuan industry" and, "After decades of invalidism, prescribe medicine to wake up the sick." The ones for the Huaxing Filature read, "From mulberry to silkworm to silk, start to change the established practice from the North Sichuan." "From family to village to country, gradually spread reputation to foreign countries." There was also a horizontal inscription on the doorway's beam which

⁵⁵ Ibid., pp. 37, 41.

⁵⁶ Chen Kaizhi, *Quansangshuo*, p. 3.

proclaimed, "Benefit Sichuan."⁵⁷

It is hard to tell the extent to which his economic nationalism was a result of his Confucian background, but Chen Wanxi did present himself as a loyal follower of Confucianism throughout his life. He was educated in the Confucian classics and started his career as a Confucian teacher. Although he accepted foreign technology and became a successful industrialist, neither his ideology nor his business management practices was westernized. In his photographs, he dressed like the Chinese gentry with traditional gown and jacket. The only modern thing shown in the picture was a foreign hat that was popular and considered as a part of formal outfit in Republican China. It is hard to imagine the old Chinese gentleman as an industrialist tycoon in Sichuan. This image that he left was further verified by his books, writings, and business management practices.

According to Chen, Confucian teachings guided him to practice sericulture. Sage Mencius's saying that prosperous sericulture was an important symbol of national wealth and strength encouraged him to invest in sericulture. Mencius had opined that "A household with field of five mu should cultivate mulberry, so that the old could wear silk. If the old could wear silk and eat meat, the king of the state is invincible."⁵⁸ Confucian teachings motivated him to conduct experiments while practicing sericulture, because Confucius once praised the Sage Shun because he

⁵⁷ Feng Deliang and Leshanshi zhengxie wenshizu, "Leshan huaxin sichang xingshuaiji", pp. 34, 36.

⁵⁸ *Mengzi* (The Works of Mencius), *juan* 1.

“loved to ask questions and loved to examine familiar words, passing over what was unhelpful to expand upon those ideas that had merit.”⁵⁹

Chen stressed he practiced the five characteristics of benevolence (*ren*) as prescribed by Confucius in the management of his enterprises. To be benevolent means to be respectful (*gong*), lenient (*kuan*), honest (*xin*), intelligent (*min*), and kind (*hui*). He was comfortable with harvesting the profit from sericulture. “I consider [the profit from] sericulture as what I deserve. It is offered by the heaven and generated from the earth. I contest with no one. The whole world cannot take away sericulture from me.” This was being respectful. He treated workers like his children - leniently. He paid the salary of workers according to their work performance and to fixed rules and regulations, which is equivalent to being “honest”. To help others memorize the principles of sericulture, he composed *Filature Folk Song* and *Women Reeling Song*. He considered these pieces of work a reflection of his intelligence. His ability to allow everyone to work for him demonstrated kindness.⁶⁰

The Confucian philosopher’s dictum surely provided Chen great psychological comfort. The imperial government and Confucian sages both encouraged silk production. When Chen started planting mulberry trees and raising silkworms and received the ridicule of his fellow villagers, he could quote the sages’ teachings to explain he was following their direction. When he expanded into raw silk

⁵⁹ *Zhongyong* (The doctrine of the mean), *juan* 6, Translation from *Focusing the Familiar: A Translation and Philosophical Interpretation of the Zhongyong*, Roger T. Ames and David L. Hall (Honolulu: University of Hawai'i Press, 2001), p. 91.

⁶⁰ Zhao Xi, *Wanxisou zhuan*; and Zhong Likan, “‘Binongsi’ de xingshuai”, p. 81.

manufacturing and became a rich businessman, the quotations were important to negate the “cunning” characteristic of profit seeking in trade and industry that was despised by conservatives. Throughout his entire life, he took every opportunity to impress others with the image of Confucian followers.

However, Confucianism is more appropriately explained as his values and outlook on the world and life. It seems that he was not a hypocritical Confucian follower. The values and outlook that he was inculcated in when he was young and that he taught when he was a teacher were impossible to be discarded. He even tried to teach Confucian values to the silkworm raisers through his sericulture manuals. He believed those teachings could create reciprocal benefit between the natural environment and the people, and among the people by regulating people’s behavior. He felt comfortable in following Confucian teachings and in modeling his life in the image of a Confucian follower. In his last years, his interest turned to neo-Confucianism, and he was industrious in exploring it, according to one biography.⁶¹

His Confucian beliefs and his nationalism convinced Chen to share his profitable technology with the whole society. Personal achievement was not the end of one’s Confucian cultivation, but the beginning of a route to manage state affairs and to govern the world well. As Chen says, “My enterprise started in supporting myself, and then allowed me to support the others.” “I dare not monopolize the profit from

⁶¹ *Santai xianzhi*, 1931, *juan* 8.

sericulture.”⁶²

Chen composed sericultural manuals, the *Binong zuiyao* (Essential principles for benefiting agriculture) and the *Quansangshuo*, to spread his knowledge on mulberry cultivation, silkworm egg card production and preparation, and silkworm rearing. In the preface of the *Binong zuiyao*, Chen’s friend explained Chen’s purpose in writing this book in detail,

“In the past ten years or more, Chen put away his writing brush and ink slab, and dedicated himself to sericulture. His profit is fairly good and his family has achieved well-being. Fellow villagers admire his success and know that he is not a reckless person. They often consult him about sericulture. Chen is always patient in explaining, and gradually plans to publicize his knowledge. ... Chen considers the hardship of people, and wants to broadcast the benefit of sericulture. Afraid of not reaching every household, he has to write it down.”⁶³

In the *Quansangshuo*, Chen further articulated his wishes,

“I hope for the relatives, friends, and people in nearby counties who have learned my skill to spread the skill to all people in Sichuan.”

“Now China is poor and the people are in hardship. Everyone wants improvement. If the government promotes sericulture from above, and the

⁶² Zhao Xi, *Wanxisou zhuan*.

⁶³ Chen Kaizhi, *Binong zuiyao*, preface, p.1.

local leaders support it from below, fathers persuade sons, elder bothers encourage younger brothers, and people follow policies, achievements will be made with small effort. We can expect prosperity soon.”⁶⁴

These works were printed in substantial quantities and circulated throughout the whole province. The Yilong county government distributed copies of the *Binong zuiyao* to its sericultural districts as a guidebook in 1904.⁶⁵ Mianzhu county circulated the *Quansangshuo* to all administrative levels in the county in 1918.⁶⁶ The provincial governors and officials all encouraged other counties and prefectures to follow Chen’s example in promoting sericulture and developing the silk industry.⁶⁷

Other than composing manuals to spread sericulture indirectly, he taught sericulture technology by example. Chen’s success set up a model of gaining wealth from sericulture in Santai. Sericulture became a popular practice for both the poor and the rich classes in the region at the turn of the twentieth century, when it had earlier been an occupation for the poor peasants in the mid-nineteenth century. Chen taught and encouraged his relatives, friends, neighbors, and others to engage in mulberry cultivation. In some cases, he even provided financial aid or technical instruction to those who wanted to participate in sericulture.⁶⁸

⁶⁴ Chen Kaizhi, *Quansangshuo*, pp. 1, 3.

⁶⁵ Li Zhaoming, *20 shiji Sichuan quan jilu*, p. 44.

⁶⁶ Sichuan mianzhu xianzhi bianzhuang weiyuanhui, ed., *Mianzhu xianzhi* (Mianzhu county gazetteer) (Chengdu: Sichuan kexue jishu chubanshe, 1992), p. 607.

⁶⁷ *Minguo Leshan xianzhi* (Leshan county gazetteer) (1934, reprint, Chengdu: Bashu shushe, 1992), *juan* 9.

⁶⁸ Chen Kaizhi, *Quansangshuo*, pp. 22-23.

In the 1900s, following Chen's leadership, the county became famous for its sericulture and related businesses. The local gazetteer said that "Ever since Chen Wanxi composed the *Binong zuiyao* and reformed sericulture in our county, the silk industry is more and more prosperous. The families of long-standing fame and clans of large wealth may not farm, but it is rare that they are not engaged in silkworm rearing."⁶⁹ Nearby regions purchased mulberry seeds and mulberry saplings from Santai when the provincial and local government carried out sericulture promotion programs during the late Qing reforms. Chen proudly and exaggeratedly described the situation at that time, "in the two rivers of Santai, fishes are intoxicated by the pulp of the mulberry fruits, and boats are filled with mulberry seedlings."⁷⁰ It is no wonder that the Santai gazetteer categorized him within the group of individuals who were benevolent to the society.⁷¹ Chen also introduced the practice of intercropping mulberries and foodstuff crops into his region. A report in the 1930s notes that investigators occasionally witnessed the intercropping of mulberries and foodstuff crops in Santai while peasants in nearly all other sericulture regions in Sichuan only cultivated mulberries on waste land or yard corners.

Chen encouraged mulberry cultivation and silkworm rearing partly for the sake of getting better and cheaper cocoons for his silk reeling business. However, his direct participation in the technological diffusion of silk reeling demonstrates that he voluntarily shared the gains with the whole society. His activity was very much unlike

⁶⁹ *Santai xianzhi*, 1931, *juan* 25.

⁷⁰ Chen Kaizhi, *Quansangshuo*, p. 1.

⁷¹ *Santai xianzhi*, 1931, *juan* 25.

the silk entrepreneurs in Europe. In fourteenth century Italy, towns and guilds kept silk technology a top secret for their own benefit.⁷² Similarly, improvements or innovations in silk making were concealed by the factories in the nineteenth century Britain.⁷³

Chen did not keep the technologies for the sole benefit of his own family or county, but enthusiastically spread these across the entire province. He first introduced the non-re-reeling small frame, and later, the re-reeling small frame. The latter one had a re-reeling procedure to finish silk reeled off the cocoons, and hence could yield better silk than the former one. Although these devices were still human-operated and labor-intensive, the quality of raw silk was increased significantly. Fine and even raw silk from the improved reeling frames replaced the traditional coarse silk reeled in Santai.⁷⁴

Chen was willing to share the improved reeling technology with people beyond his region too. He trained technicians in factory management and the use of reeling technology. The Intendant for the Encouragement of Enterprise granted technicians trained in Chen's filature the same status as the graduates of the provincial sericulture promotion center. These technicians possessed good reputations and were often hired by new factories with high salaries. They helped set up and manage

⁷² Dieter Kuhn, "Textile Technology", pp. 428-432.

⁷³ Christine MacLeod, "Strategies for Innovation: the Diffusion of New Technology in Nineteenth-Century British Industry", *Economic History Review* 45, 2 (1992), pp. 293-294.

⁷⁴ *Santai xianzhi*, 1931, vol. 13.

quite a few reeling factories in Sichuan, such as in Qianwei, Baoning, and Mianyang. Besides providing technicians and managers, Chen was personally involved in the establishment of reeling factories in other Sichuan regions, by purchasing machines, selling goods, and even collecting capital.⁷⁵

Binong zuiyao: technology and morality

Chen Wanxi composed the *Binong zuiyao* in 1897, two decades after he dedicated himself to the advancement of sericulture. This is the first and the most influential sericultural manual that he composed in his life. It was popularly circulated in the province in the early twentieth century. It was also one of the most influential sericulture manuals in modern Sichuan. Its importance in the history of sericulture is underlined by its reprint by the renowned leading Chinese publisher Zhonghua shuju in 1956.

It is notable that the manual was not a result of absorbing foreign scientific knowledge, but based on empirical experience, traditional skills, and ancient agriculture books. During his early years as a mulberry plantation owner, Chen read two books carefully and thoroughly, the *Nongsang jiyao* (Essentials of agriculture and sericulture) published by the Yuan government and the *Sannongji* (Records of three aspects of agriculture) authored by a Sichuan native in the 1760.⁷⁶ The techniques of Chinese sericulture lasted several thousand years and experienced few significant

⁷⁵ Chen Kaizhi, *Quansangshuo*, pp.2, 22-23.

⁷⁶ Zhong Likan, “‘Binongsi’ de xingshuai”, p. 79.

improvements since their shaping in the Song. The *Nongsang jiyao* was officially published in 1286. The *Sannongji* was written about one hundred years before Chen was born. These works are based on indigenous knowledge that was popularly practiced in China but also had many weaknesses, particularly in understanding, preventing and curing diseases.

What Chen had done was to test the effectiveness of these traditional techniques through his own practice. Historically, the Chinese educated elites and government officials composed sericulture manuals, but hardly any writer verified the reliability of the techniques that were recorded. Chen's manual was therefore distinctive despite primarily following the traditional techniques.

“I do not include some ancient methods of grafting mulberry and rearing silkworm, because I tried all of them and my experiments did not prove that some of them are effective. But I am not sure whether it is because it is not suitable for the region or because I did not have it done rightly.”

“The clumsy village women ... either followed older generations, or learned from hearsay. These are all ancient ways. ... I tried these and proved them effective. Therefore I dare to publish them.”⁷⁷

The most remarkable new method that Chen contributed is probably the cliff cave for storing mulberry leaves. The best leaves for feeding silkworms should be

⁷⁷ Chen Kaizhi, *Binong zuiyao*, pp.1-2.

fresh and clean. Leaves should be neither too dry nor too damp. High temperature can easily dry up the juice, or ferment the leaves. In the silkworm season, the early summer, it is hot and rain comes unpredictably. The storage of leaves was traditionally problematic and troublesome. Chen found out that putting leaves in cliff caves could preserve their freshness longer because the temperature inside the cave is lower than that in the house or in the hovel below trees.⁷⁸ In my interview with the director of the Sichuan Provincial Silkworm Breeding Station in Suqi, Leshan, the director showed me the silkworm rearing buildings. These buildings have semi-basements, which were used to keep mulberry leaves because its coolness was ideal for keeping the leaves fresh. The cliff cave actually served the same function as the semi-basements in the modern buildings.⁷⁹

There were more inventions. For example, Chen creatively used machine-woven fine textile to make silkworm egg cards. According to him, this was better than traditionally used thick paper. In pest control, his advice reveals the wisdom of taking advantages of local conditions. Smoking tobacco pipe was a popular practice in the villages in Sichuan. For controlling mulberry longicorn, he suggests a convenient and cheap method of injecting oil that remained in tobacco pipe into the hole drilled by longicorn. His suggestion proved effective.⁸⁰

Despite some innovations and his ceaseless experimentation on the

⁷⁸ Ibid., p. 5.

⁷⁹ Interview with Zhang Maolin, 10 June 2009.

⁸⁰ Chen Kaizhi, *Binong zuiyao*, pp. 35, 27.

effectiveness of traditional knowledge, Chen at the most presented an understanding of sericulture based on empirical practice. He could not explain the reasons and the phenomena in measurable and testable scientific ways. For example, Chen doubted the usefulness of washing silkworm egg cards with salty water. He experimented and proved that silkworm eggs could survive salty water washing. However, he gave a wrong explanation for it. He thought that the nature of silkworms belonged to “fire”. Accordingly, he thought salty water could neutralize its nature, and calmed down its temper.⁸¹ Although he pointed out that egg washing could kill weak eggs, his basic principle was faulty. He did not notice that the egg washing has side-effects. Salty water had little effect on disinfection, much less than limewater, another traditional egg washing material. But both adversely affected the embryogenesis of eggs.⁸²

Chen’s explanation of many silkworm diseases was empirical but lacked proper theories. Before reading the following quotes, one needs bear in mind that the West had made significant contribution to identifying and preventing silkworm diseases in by the time. For instance, Louis Pasteur by the end of the 1860s had found the cause of the pebrine disease and invented a method of controlling it, the worst disease that had nearly wiped out sericulture in France.

“[Silkworm] likes cleanness and hates dirt. Once they sense the foul, silkworm shrinks. And the fine silkworm of deep green and white colors changes into

⁸¹ Ibid., pp. 37-38.

⁸² Guo Wentao and Cao longxue, eds. *Zhongguo jindai nongye kejishi* (History of science and technology of agriculture in modern China) (Beijing: Zhongguo nongye keji chubanshe, 1989), p. 554.

yellow and stopped eating immediately. After three days, it dies. ... [It] likes dry and hates dampness. If it is too damp, the silkworm gets white mold. [It] likes *yang* and hates *yin*. If it was hurt by *yin*, it often catches white muscardine. In the sunny and warm day, windows ought to be opened to facilitate the aeration of *yang*. [It] likes ventilation but not being blown by direct wind. ...If the window is facing the wind, the silkworm will catch colds. Those who get a cold will extend their bodies but will not eat. And the door to the silkworm rearing room should not be opened rapidly. Wind that blows on the silkworm all of a sudden is called cunning wind. It makes the silkworm catch red muscardine easily.”

“Obscene words and scatological languages are not allowed. Strangers and people in mourning are forbidden from entering the rearing room. If a stranger enters the silkworm rearing room or calls outside the door, the silkworm becomes sick immediately. It either moves around on the mat, or stops eating. If people in mourning enter the room, the silkworm often dies of sudden illness.”

“Fog is poisonous. If the silkworm eats leaves picked in fog before the Big Sleep, it will become the white-stomach silkworm when it is old. White body fluid oozes out from its stomach. If a fine silkworm is contaminated by the fluid, it also dies. If it is foggy, the door to the silkworm rearing room should be closed. ... If the silkworm eats leaves that have been stored too long before

the Big Sleep, it also catches the disease of white-stomach.”⁸³

Modern scientific research has proven that these factors and conditions outlined by Chen were not the triggers of silkworm diseases. The white muscardine disease is not the result of unsuitable *yin* and red muscardine disease is not acquired from the silkworm being chilled by the wind. Instead, they both result from fungal infection.

Furthermore, that insulting words, strangers, and people in mourning can cause the diseases and even death seems irrational. These ideas were based on the popular belief that silkworm liked cleanliness in their physical environment – where they lived, the food they ate and – their spiritual condition, which must remain unsullied. Insulting words were dirty. People in mourning had contact with death. And strangers were dangerous. All of these posed threats to the spiritual condition, according to popular beliefs then.

In talking about feeding silkworm with good leaves, Chen was right. However, the cause of disease with the symptom of a white stomach is not related to the leaves picked in the fog, or the “fog leaves” as they were called. Fog is not harmful, nor fatal to silkworm. The so-called “white stomach” disease is passed on by eating leaves contaminated by viruses such as *Bombyx mori* cytoplasmic polyhedrosis virus (BmCPV) and *Bombyx mori* nucleopolyhedrovirus (BmNPV). Neither do long-stored leaves cause “white stomach”. Long-storage of leaves increased the risk of

⁸³ Chen Kaizhi, *Binong zuiyao*, pp. 7-8.

contamination by viruses. Fresh leaves contain higher nutrition than long-stored leaves, but the stale leaves themselves were not the reason of disease.

All in all, there was no distinctive fundamental difference between the *Binong zuiyao* and other Chinese sericulture manuals. The *Binong zuiyao* merely accepted the traditional Chinese sericulture techniques and tested them in the local environment. On the one hand, it retained sophisticated skill and knowledge based on thousands of years of practice in China. On the other hand, it provided neither scientific explanations for the practices nor revolutionary methods. About ten years later, when Chen became the owner of two large steam filatures in Sichuan, he composed the *Quansangshuo* to encourage mulberry cultivation in Sichuan. However, like the *Binong zuiyao*, it still shows little influence from foreign scientific achievements.

In addition to following and developing traditional sericultural technologies in mulberry cultivation and silkworm rearing, Chen also deliberately included Chinese moral teachings as an essential part of his sericulture skill repertoire. He actively broadcasted these moral teachings to the masses. These teachings are filled with a strong sense of the principles of reward and retribution.

At first glance, the idea of virtue and evil presented by Chen Wanxi was not a result of Confucianism, but a reflection of Buddhism or popular folk beliefs. Killing life is unbearable. Those who done evil will be punished, and those who done good will be rewarded. This is normally explained with the theory of Karma. In Chinese folk

beliefs that were influenced by Buddhism, inappropriate killing could bring punishment too. Buddhism and Buddhism-infused folk beliefs probably influenced Chen's perspectives.

However, the close examination of the text reveals also a strong Confucian influence. First of all, retribution comes when people are not considerate to others. Confucius encourages consideration. A man should be sensitive to others' feeling and not apply what he does not like to others. Chen elaborated it with the case of practicing sericulture. According to him, peasants engaging in sericulture should love others' mulberry trees as their own. Vandalism of others' trees is tantamount to vandalizing the vandal's own heart. Once the heart is vandalized, his life and property are in jeopardy. Stolen leaves are dirty and silkworm fed by stolen leaves will not be successful. Foul leaves cause sickness of silkworms and should not be sold to others. "Think about integrity when facing personal gains. If one does not practice consideration for others, he is behaving unjustly, which surely brings punishment from the heaven."⁸⁴

Second, Chen recommended silkworm raisers to pray to sericulture deities reverently, though he did not believe in divination. Divinations will not come true, but devotion reflects dedication and virtue. In praying and making offerings, one often makes promises to be righteous. Any violation of the promises can bring misfortune or punishment. In the sericulture society organized and led by Chen,

⁸⁴ Ibid., p. 2.

everyone had to pray on the birthday of the silkworm god, on the twelfth days of the last lunar month.⁸⁵ Rather than the plain prayers of commoners and peasants who simply prayed for good harvests, in the philosophy of Chen Wanxi, praying to sericulture gods conveyed a more important message – a promise of self-discipline. “Anyone who is greedy for, and monopolizes, profit is against Heaven.”⁸⁶

Third, in Chen’s opinion, a silkworm has a life like a human being. The silkworm’s life cycle is like that of human being. He analogized the cocooned silkworm as a Confucian immaculate man who died but left merits and accomplishment. In contrast, the silkworm that did not cocoon was like petty man who ate but did not contribute to the world.⁸⁷ One should not kill silkworms, even those sick ones. The killing of silkworms would lead to punishment. He illustrated a case in 1893. When leaves were expensive a villager discarded all his silkworms into his stove, and subsequently this person’s house burnt down several days later.⁸⁸ His sericulture society strictly forbade any killing of silkworms.⁸⁹

Unlike Buddhism, Confucianism does not entirely oppose killing. Confucianism holds the idea that, on the one hand, one should not fear death, and on the other, one should also have affectionate love for life, and any easy rejection of life is unforgivable. This affection extends not only to human life, but also to other living

⁸⁵ Yin Liangying, *Sichuan canye gaijinshi*, p. 22.

⁸⁶ Chen Kaizhi, *Binong zuiyao*, p. 3.

⁸⁷ *Ibid.*, p. 4.

⁸⁸ *Ibid.*, pp. 40-41.

⁸⁹ Yin Liangying, *Sichuan canye gaijinshi*, p. 23.

creatures. What it is against is the inappropriate time of killing. *The Sayings of Confucius* records a story about Gao Chai who did not kill during inappropriate times, and comments, "Do not kill the insects just waking up from winter sleep. This is to follow the way (*dao*) of human being. Do not nip grass and trees that had just budded. This is called benevolence."⁹⁰ It was the Buddhism that introduced the idea that all killing is not allowed and will result in punishment. Research has revealed that this Buddhist attitude had reverted to the previous set of beliefs by the time of the Ming and Qing dynasties.⁹¹ Instead, it is untimely killing and inappropriate killing that brings punishment. At the same time, Chinese society highly appreciated the well-being of cattle and silkworms because they are both beneficial to human beings. The case of burning silkworms that Chen Wanxi illustrated was an example of inappropriate killing. Cocooning was the end of silkworm's life cycle. Killing them before they cocoon was an unbearable sin which incurred punishment. What Chen preached was not the Buddhist principle of Karma, but the Confucian love of life and appreciation of death.

These illustrations and teachings reflect Confucian morality. Unlike the rural small peasants who believed in sericulture deities for protection and defense from misfortune, Chen believed that men were required by divine authority to practice self-discipline in order to create perfect Confucian men and maintain communal welfare. These moral teachings encouraged people to be reverent to gods, controlled

⁹⁰ *Kongzi jiyu* (The school sayings of Confucius), dizixing, chapter 12.

⁹¹ Liu Daochao, *Zhongguo shan'e baoying xisu* (Chinese custom of the judgment of virtue and evil) (Taipei: Wenjin chubanshe, 1992), pp. 110-112.

personal activities, expressed positive expectations, promised a bright future, and explained unwanted results.

Nevertheless, this kind of moral teaching was not a driver of technological improvement, but a handicap.⁹² There was no effective defense or active response in the advent of natural disasters. There was no means of preventing and curing diseases. God and heaven were the only protection. Sincere prayers and good behavior were the sole way. The devotion and adherence to the idea of the judgment of virtue and evil was therefore a factor in preventing the modern development of sericulture.

Conclusion

The literate well-to-do elites who had economic, political, and cultural influence at the local society actively participated in sericulture reform in Sichuan during the closing years of the Qing dynasty. They were frustrated with the economic and political situation of China and Sichuan in the nineteenth century. Some revolutionaries sought both economic and political reforms. More considered that the political failure was the result of economic deficiencies that ought to be improved. They started large scale mulberry plantations in the countryside, conducted and propagated technological improvements in silk reeling. They invested in steam filatures and successfully entered the international filature silk market. Through training programs and teaching by example, these wealthy participants

⁹² Ibid., p. 186.

shared sericulture technologies with the broader society. For these private participants, the indigenous and foreign technologies were not necessarily distinguished from each other. They innovated, promoted, and practiced the techniques they considered the most suitable to the present social, economic, cultural, and technological conditions.

Chen Wanxi was one of the pioneers in utilizing the principles of the economies of scale in sericulture and the most successful filature entrepreneur in Sichuan. He probably reminds readers of Zhang Jian, one of the most extensively studied Chinese entrepreneurs in modern China.⁹³ In fact, he represented many contemporaneous educated elites who participated in economic enterprises. He was influenced by Confucian values and traditional sericulture technologies, but did not reject modern technology. He was interested in both educational and economic enterprise. As a member of the literate elite who was engaged in sericulture without previous skills, he did not extract skills and knowledge from rural producers. On the contrary, he actively participated in diffusing skills to rural producers.

Despite their devotion to improving and sharing technology in the society, these private efforts were generally weak. Chen's sericulture manuals were filled with moral teaching, and lacked effective means of controlling disease, the largest threat

⁹³ For example, Qin Shao, *Culturing Modernity, the Nantong Model, 1890 – 1930* (Stanford: Stanford University Press, 2004); Elisabeth Köll, *From Cotton Mill to Business Empire, the Emergence of Regional Enterprises in Modern China* (Cambridge and London: Published by the Harvard University Asia Center, Distributed by Harvard University Press, 2003); and Marianne Bastid, *Educational Reform in Early Twentieth-Century China*, trans. by Paul J. Bailey (Ann Arbor: Center for Chinese Studies, University of Michigan, 1988).

to rural cocoon production. The sericulture societies that taught foreign knowledge, however, were not better than Chen in spreading improved sericulture, in terms of scale and influence. More importantly, there was no means of relieving producers from silkworm diseases, the major factor that caused loss in cocoon production. Individual private promoters were incapable of leading major change in the productivity of cocoon output. As private promoters, they had neither sufficient knowledge nor firm strength to fight against the shortcomings of sericulture and silk industry in Sichuan.

CHAPTER FIVE

Prosperous Business and Limited Technological Development in the Age of Warlordism, 1910s – 1931

The reform efforts to rescue the waning dynasty brought about radical effects that precipitated the 1911 Revolution and contributed to the dynasty's sudden collapse. Sichuan was politically detached from central government control soon after the founding of the Republic of China, and was not reintegrated into Chinese national politics until 1935. During this interim period, this province was engulfed by rampant wars among various warlords.

The wars endowed upon Sichuan an image of political chaos and economic backwardness. Journalist John Gunther commented in 1942, "For years it was the most backward province of China proper".¹ S. A. M. Adshead argues that, after 1911, Sichuan "became the worst province of a half-modern republic".² David Bonavia, similarly, views Sichuan as being plagued by "considerable disorder" and "economic depression" brought by the civil wars that erupted after the death of Yuan Shikai in 1916.³ In their research on Sichuan warlords, Kuang Shanyi and Yang Guangyan claim that the heavy taxes the warlords imposed on trade and various commodities

¹ John Gunther, *Inside Asia* (New York, London: Harper & Brothers: 1942), p. 202.

² S. A. M. Adshead, *Province and Politics in Late Imperial China*, p. 2.

³ David Bonavia, *China's Warlords* (Hongkong: Oxford University Press, 1995), pp. 145-149.

caused the decline of industry and commerce, especially the silk industry.⁴

However, historical records demonstrate that there was in reality growth in the levels of industry and commerce during the 1910s and 1920s. The silk industry, for example, presents a remarkable case that refutes the commonly-accepted claim that warlordism gravely obstructed industrial and economic growth in Sichuan. In terms of the output of cocoons and raw silk, the silk industry experienced unprecedented prosperity during this period. The data raises questions about whether the political situation had damaged and inhibited the development of industry and economy as heavily as many researchers have assumed.

Against a background of political disintegration among national, provincial, and local levels, local elites, military authorities, and Japanese investors affected sericulture in different ways. While the military authorities hardly helped to develop sericulture in Sichuan, they did not impose extremely heavy taxation on sericultural products. The military competition among warlords and the absence of centralized economic management left the task of technological development in the hands of the local luminaries. The local elites continued to introduce techniques and technologies, albeit with limited influence on the local community. In contrast to the rather obsolete technologies that local elites spread, subsequent Japanese influence exerted a more significant impact on the diffusion of advanced technology in raw silk

⁴ Kuang Shanji and Yang Guangyan, eds., *Sichuan junfashi* (History of warlords in Sichuan) (Chengdu: Sichuan renmin chubanshe, 1991), p. 396. For similar argument, also see Sichuan jianshi bianxiezu, ed., *Sichuan jianshi*, pp. 259-262.

reeling.

Sichuan during the Republic

The railway crises triggered the collapse of the Manchu regime. Private merchant management or governmental control over railways was the central issue. The railway-rights recovery activists strongly opposed foreign involvement in the railways but the government was financially needy and had to rely on tax surcharges and foreign loans. The Zhejiang-Jiangsu, Guangdong-Hunan-Hubei, and Sichuan railway recovery episodes were the largest and most influential among the railway-rights recovery movement. The Sichuan Railway Company was established in 1904. The government initiated a “rental share” system that levied 3 percent surcharge on rental income to finance the company. It was reorganized as a privately-managed company in 1907, but the company was rife with internal strife, inefficiency, and corruption. The corruption and financial failure caused by illegal investment led to the government’s decision to nationalize the railway in Sichuan in 1911, and this was yet again financed through acquiring loans from the Western countries. These decisions roused patriotic sentiments, as well as acrimony over the unsatisfactory compensation of previous share-holders.⁵ Demonstrations and strikes soon erupted, and escalated in the following months into armed violence throughout the province. The Qing court had to send troops in Hubei to suppress the

⁵ Mary Backus Rankin, “Nationalistic Contestation and Mobilization Politics: Practice and Rhetoric of Railway-Rights Recovery at the End of the Qing”, *Modern China*, 28, 3 (July, 2002), pp. 317, 323 -324.

railway-rights recovery movement in Sichuan. Consequently, the army mutinied in Wuchang, Hubei, in October 1911, which led to the end of the imperial political system in China.

Sichuan province renounced Manchu government control in November 1911. A new provincial government called the Great Han Sichuan Military Government (*Dahan Sichuan junzhengfu*) was organized under Pu Dianjun, the renowned leader of the railway-rights recovery movement in Sichuan. This newly established government had neither the military power to control the troops from various backgrounds nor the political ability to appease political dissidents, and collapsed in less than a fortnight. The failure of the provincial government suggests that Sichuan had fallen into a state of disintegration beyond the control of any local authority.

Sichuan was a perfect base for the warlords. After Yuan Shikai's demise in 1916, there was no central government that could reconstruct a political structure that was able to supervise all the regions in China. Sichuan was geographically distant from the reach of the central power, which made control and penetration from outside difficult. Economically, the province was abundant in natural resources, and possessed the capacity to support independent political entities. Furthermore, the large rural population presented a ready supply of manpower for military operations.

Sichuan after the 1911 Revolution was dominated by militarists and wars. James E. Sheridan counted 477 wars in Sichuan between 1912 and 1935.⁶ With the

⁶ James E. Sheridan, *China in Disintegration, the Republican Era in Chinese History*,

exception of the first years of the Republic when Yuan Shikai was in power, Sichuan was engulfed by fierce wars in the 1910s. The 1920s however, saw relative peace, according to Robert A. Kapp, due to the shaping of the garrison system, which successfully restored the political equilibrium within Sichuan.⁷ The warlords started the garrison system in 1918. Garrison areas varied over time depending on the territories controlled by the warlords but they remained relatively stable between the mid-1920s and 1930. The garrison areas were almost autonomous kingdoms, in which the military authorities monopolized power over both civil and military affairs.

Military rivalries created economic difficulties in Sichuan. Wars frequently destroyed crops in the countryside, and inhibited regular business in the towns. Afraid of being conscripted, peasants often abandoned their lands and went into hiding.⁸ Irrigation systems fell out of maintenance. The ability of the rural communities to defend themselves from natural disasters declined. Warlords printed money excessively within their garrison areas, which caused the inconsistency of the currency system and inflation.

Among all the negative impacts of warlordism on the economy, tax exploitation was the most condemned. Unlike the Manchu government that spent a great amount of tax revenue on reform projects that could be of benefit to the society, the military regimes relied on taxation to maintain armies, support war expenditure, and

1912 – 1949 (New York: The Free Press, 1975), p. 199.

⁷ Robert A. Kapp, *Szechwan and the Chinese Republic: Provincial Militarism and Central Power, 1911-1938* (New Haven and London: Yale University Press, 1973).

⁸ Peng Tonghu, *Sichuan jindai jingjishi*, pp. 223-227.

accumulate personal wealth, rather than attempt economic and social reconstruction. From 1912 to 1930, land tax increased nearly 38 times.⁹ In some cases the government collected land taxes for decades in advance.¹⁰ In addition, various categories of fees were extracted, such as opium-prohibition fees, surcharges on the land tax, commodity taxes on land deeds, alcoholic beverages, and tobacco, salt tax, miscellaneous levies, etc.¹¹ Jacob Eyferth records a local joke expressing resentment towards the taxation - “since ancient times there’s never been a toilet fee, but nowadays only a fart is free.”¹²

Despite the economic difficulties and political turmoil, there were also physical developments in the province. For example, by 1935, modern roads had connected Chengdu with several major regional commercial centers. The first railway was constructed in 1931.¹³ Telephone communication had reached many rural villages by the early 1930s.¹⁴ The first province-financed university, the University of Chengdu,

⁹ John Lossing Buck, *Land Utilization in China*, p. 330.

¹⁰ Sichuan jianshi bianxiezhu, ed., *Sichuan jianshi*, p. 260; Zhang Youyi, ed., *Zhongguo jindai nongyeshi ziliao* (Historical materials of agriculture in modern China) (Beijing: Sanlian shudian, 1957), vol. 2, p. 565.

¹¹ Robert A. Kapp, *Szechwan and the Chinese Republic*.

¹² Jacob Eyferth, *Eating Rice from Bamboo Roots*, p. 103.

¹³ Robert A. Kapp, “Chungking as a Center of Warlord Power, 1926 – 1937”, in *The Chinese City between Two Worlds*, ed. Mark Elvin, and George William Skinner (Stanford: Stanford University Press, 1974), p. 151.

¹⁴ For example, village telephone communication reached into market town in Xindu in 1927. It covered the major administrative villages in Leshan in 1932. It was also started to be set up in rural Anxian and Changshou from 1930, and in the administrative villages in Anxian in 1931. See *Xindu xianzhi* (Xindu county gazetteer), 1929; *Changshou xianzhi* (Changshou county gazetteer), 1944, *juan* 11; and *Anxian xuzhi* (Continued Anxian county gazetteer), 1938, *juan* 1, cited in Dai Angang, ed., *Zhongguo difangzhi jingji ziliao huibian*, pp.1045-1046. Also see *Chuan bao* (Sichuan news), 7 May 1932.

was established in 1925. The urban landscape was transformed by the introduction of modern public parks and infrastructure. Modern industries and transportation facilities continued to develop during the era. The most famous and successful of these was the Minsheng Shipping Company. It successfully conducted and dominated steam shipping in the upper Yangzi River.¹⁵ Sichuan at the time was not in a completely dark age of cultural decline, social collapse, and economic bankruptcy.

The Prosperous Silk Business

Like other economic sectors, sericulture expanded in the age of warlordism in the 1910s and 1920s. The output of both cocoons and raw silk significantly increased from the late Qing onwards. The production of Sichuan cocoons was estimated to have reached the levels of 205,800 piculs in 1880, 640,000 in 1915-1917, 600,000 in 1925, and 468,000 in 1926.¹⁶ Cocoon output had increased at least twice from the late nineteenth century to the mid-1920s. In terms of growth rate, Sichuan's was the highest among all the provinces.

TABLE 2 Estimates of annual output of cocoons by provinces (in piculs)¹⁷

	1880	1915 – 1917	1925	1926

¹⁵ Robert A. Kapp, "Chungking as a Center of Warlord Power, 1926 – 1937", p. 151.

¹⁶ Lillian M. Li, *China's Silk Trade*, p. 98. These data are extracted from various sources. Estimates of Chinese cocoon output have long been recognized as inaccurate because of the nature of Chinese sericulture. However, these data are the most reliable ones that researchers can acquire nowadays. According to different source materials, the cocoon yields were significantly different in 1925 and 1926. But according to the custom statistics, the export of Sichuan raw silk in 1926 was much more than 1925, and two times of that in the 1910s.

¹⁷ Lillian M. Li, *China's Silk Trade*, p. 98.

Zhejiang	825,500	876,766	1,000,000	1,140,000
Jiangsu	275,200	266,745	350,000	545,000
Guangdong	576,100	768,300	1,000,000	1,057,400
Sichuan	205,800	640,000	600,000	468,000
Hubei	79,100	100,000	100,000	122,900
Henan	100,800	—	100,000	42,900

Many counties recorded the prosperity of sericulture during these years, as revealed by increased cocoon prices and booming demand. In Cangxi, the price of a local measure of fresh cocoons increased from 30 to 40 cents in 1912 to 60 to 70 cents in the 1920s. In 1925, the price reached even as high as 80 to 90 cents.¹⁸ The output of cocoons in Jingyan increased from about 150,000 catties at the beginning of the Republic to over 800,000 catties after 1921.¹⁹ The output of raw silk doubled from 1,129 piculs in 1927 to 2,562 piculs in Nanchong in 1930.²⁰ In Suining, output of raw silk in the late 1920s was about 10 times more than that in the 1900s, while the price increased six to seven fold.²¹ Santai experienced its most prosperous years of sericulture between 1927 and 1930.²²

International demand that had been growing since the second half of the

¹⁸ Li Shuqian, ed., *Cangxi cansizhi* (History of sericulture in Cangxi county) (Chengdu: Sichuan renmin chubanshe, 1996), p. 126.

¹⁹ Jingyanxian zhengxie wenshi ziliao weiyuanhui, ed., *Jingyan cansi yitiaolong*, p. 8.

²⁰ Yin Liangying, *Sichuan canye gaijinshi*, p. 325.

²¹ *Suining xianzhi* (Suining county gazetteer), 1929, *juan* 8.

²² Xiao Juefei, "Santai cansiye gaikuang" (General description of sericulture in Santai), *Jianshe zhouxun* 7, 2 (September 1938), p. 12.

nineteenth century was the major stimulus of the increased output. The total amount of raw silk exported from Sichuan increased from 7,762 piculs in 1912 to 16,571 in 1930, and reached 23,364 in 1918.²³ These figures did not include the large quantities of non-filature silk that were exported to India and Burma through Kunming. Growing exports of raw silk brought huge revenue for Sichuan, as well as China. The value of exported Sichuan raw silk always constituted over 20 percent of the total value of exported Chinese raw silk. In quite a few years, Sichuan's share climbed to over 30 or even as high as 40 percent. The data reveals a prosperous sericulture industry during the first two decades of Republican Sichuan (see Table 3).

TABLE 3 Percentage of value of exported Sichuan raw silk within total export of Chinese raw silk ²⁴

Year	Value of exported Sichuan Raw Silk (\$/Chinese dollars)	Value of total exported Chinese Raw Silk (\$/Chinese dollars)	Percentage
1912	6,163,000	17,259,000	35.7
1913	5,263,000	18,903,000	27.8
1914	6,964,000	21,592,000	32.2
1915	6,386,000	25,765,000	24.8
1916	7,693,000	27,737,000	27.7
1917	8,497,097	25,420,562	33.4
1918	8,920,667	27,324,100	32.6

²³ Jiang qingxiang and Li shouyao, eds. *Sichuan cansiyi*, pp. 14-16.

²⁴ *Ibid.*, pp. 17-19.

1919	6,872,279	30,825,975	22.3
1920	5,197,742	21,825,787	23.7
1921	13,041,089	33,725,513	32.7
1922	10,633,747	43,042,487	24.7
1923	16,472,985	50,997,394	32.3
1924	11,644,330	53,519,313	21.7
1925	11,141,004	51,015,085	21.8
1926	16,356,259	40,231,072	40.7
1927	11,875,427	51,782,303	22.9
1928	13,308,381	57,617,459	23.1
1929	17,801,175	69,067,645	25.8
1930	19,480,483	72,142,430	27.0
1931	14,181,499	56,673,105	25.0

In the mid-1930s, the provincial government reviewed the state of sericulture in previous years, and concluded that “in the past decades, Sichuan raw silk’s export was very prosperous.” This prosperity was not impeded by the uncertain domestic politics and instead, was encouraged by international demand. For example, in 1923, the government concluded that “although the domestic situation was in disorder,” business was “very stable.”²⁵ Furthermore, an earthquake in Yokohama, Japan, destroyed 40,000 bales of Japanese silk, and greatly increased Western demand for

²⁵ Jiang changxu, ed. *Sichuansheng zhi zhuyao wuchan* (Major products of Sichuan province) (Chongqing: Chongqing minsheng shiye gongsi jingji yanjiushi, 1936), p. 15.

Chinese raw silk.²⁶ The best Sichuan filature silk was sold for as high as 1,700 taels per picul in the Shanghai market that year.²⁷ Similarly, even though the local situation in Sichuan was disturbed by the warlords in 1924 and 1925, the profit from raw silk remained high due to the bullish international and domestic markets.²⁸

Among the categories of export raw silk, filature silk saw the most significant increase in output and exports. In 1912, only 1,247 piculs of filature silk were exported through Chongqing customs. The amount increased to 2,021 in 1914. In 1919, 3,177 piculs of filature silk were exported through Chongqing and Wanxian customs. After the 1920s, the rise of Japanese style filatures further increased the output of filature silk to about 6,500 piculs.²⁹ However, the increased yield of filature silk was still overshadowed by the even greater amount of non-filature silk produced in Sichuan. The reasons will be examined in the following chapter.

It is also notable that the increased export of raw silk did not ensue at the expense of domestic consumption. The exported silk formed only about 30 percent of the total output in Sichuan.³⁰ Even as the export of silk overseas boomed, the local silk weaving industry was also thriving. There were about 400 weaving workshops with over 11,000 looms staffed by 40,000 to 50,000 workers in Chengdu.

²⁶ China Maritime Customs, *Returns of Trade and Trade Reports, 1923* (Shanghai: 1924), Part I, p. 26.

²⁷ Sichuansheng difangzhi bianzhuanyuanhui, ed., *Sichuan shengzhi, sichouzhishi*, p. 125.

²⁸ Jiang Changxu, ed. *Sichuansheng zhi zhuyao wuchan*, p. 16.

²⁹ China Maritime Customs, *Returns of Trade and Trade Reports, 1914*, p. 878; *Returns of Trade and Trade Reports, 1920*, pp. 860, 864; and Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 733.

³⁰ D. K. Lieu, *The Silk Industry of China*, p. xiii.

The annual output was about 550,000 bolts of a variety of ranges of silk pieces.³¹ In Leshan in the 1920s, the output of silk pieces was about 100,000 bolts.³² Furthermore, other finished silk goods such as silk ribbons, khatags, and silk thread, consumed large amounts of raw silk within the province.

Taxation of Sericulture

This section examines the impact of taxation on sericulture in Sichuan. The level of taxation levied could facilitate or obstruct the development of technology. From the second half of the eighteenth century, for instance, the Spanish kings carried out substantial taxation reforms on textile production, in the hope of developing the textile industry in Spain. However, the central Spanish regions did not take advantage of the tax relief, in contrast to the development of textile industries in the littoral regions that enjoyed the light taxes.³³ In Sichuan, local military governments implemented taxation policies that did not favor the producers. On the contrary, many contemporary accounts and secondary works criticize taxation as having been the most destructive factor on sericulture. Heavy taxation means reduced net profit for the participants of sericulture, and increased purchase prices for consumers. The government stripped off a significant portion of revenue from mulberry cultivators, silkworm raisers, and raw silk producers, and silk dealers. In 1925, the Chongqing Silk

³¹ Liu Shizeng, "Chengdushi zhi chouduan changjiye" (Weaving industry in Chengdu), *Jianshe zhouxun* 1, 5 (April 1937), p. 1.

³² Yin Liangying, *Sichuan canye gaijinshi*, p. 371.

³³ James Clayburn La Force, *The Development of the Spanish Textile Industry, 1750 – 1800* (Berkeley, University of California Press), chapter 7.

Guild, for example, complained that the high taxation rates obstructed sericulture production and trade. Silk dealers lost money and stopped dealing in raw silk, which in turn led to economic hardship for petty sericulture farmers and workers.³⁴ However, was taxation as harmful as it was claimed to have been?

Taxes were imposed on every stage of sericulture, from the sale of mulberry leaves, the sale and transportation of cocoons, to the transportation and export of raw silk. In the major sericulture regions, there were mulberry and *Cudrania* leaf markets. Trade on the staple food of silkworms was conducted in the brokerage houses in some regions, such as Meishan. The brokerage houses were subjected to brokerage tax.³⁵ However, the trade of leaves through brokers was apparently not universal. In Santai, brokers were only involved in the purchase of mulberry leaves several months ahead of the silkworm season. In Nanchong, most of the trade on leaves was directly conducted between mulberry cultivators and silkworm raisers. A small fraction of the leaves that went to the market was subjected to a measurement tax in Nanchong. The rate was 10 percent.³⁶ As most silkworm raisers depended primarily on their own leaves, and the trade on leaves often bypassed the market, leaves were relatively less liable to taxation than cocoons and silk, in spite of the high measurement tax rate.

³⁴ “Chongqing siye gonghui kuaiyou daidian” (Telegraph from the Chongqing Silk Guild), *Shuping zazhi*, 7(June 1925).

³⁵ Huang Yunpeng, et al. *Sichuan caizheng lu* (Records of finance in Sichuan) (n.p.: 1926), p. 279.

³⁶ Yin Liangying, *Sichuan canye gaijinshi*, pp. 332, 349.

All sericulture regions imposed taxation on the sale of cocoons and silk in Sichuan, but the total amount exacted should not be exaggerated. These taxes had various names and were collected through different means. In Santai, cocoons and silk were taxed several times by different governmental departments, to offset the expenditure on military affairs, education, municipal matters, and local militias.³⁷ In Cangxi, the county bureau of industry charged every silk reeling frame 400 copper cashes (*wen*) as a cocoon measurement tax in 1918. In 1929, the chamber of commerce further imposed a tax of three wen for every 1,000 wen worth of cocoons sold.³⁸ In 1919, the Meishan government imposed levies on leaves and cocoons to collect funds to send students to study at the provincial sericulture school.³⁹ In some places, cocoon sellers were levied 2.5 percent of the selling price as a cocoon tax in 1926.⁴⁰ Despite the variety of levies, the total amount imposed was not as great as considered. For instance, the 400 wen of tax imposed on reeling frames in Cangxi was not high. In comparison, a picul of rice in Chengdu in July 1918 cost 40,400 wen.⁴¹ In Leshan, the leading sericulture and commercial center and in southern Sichuan, the local gazetteer compiled in 1934 reveals that only 2,000 strings of copper cashes were collected annually as taxation on cocoons and raw silk. The same gazetteer estimated that about 1,000,000 catties of cocoons were produced in the

³⁷ *Santai xianzhi*, 1931, *juan* 12.

³⁸ Li Shuqian ed., *Cangxi cansizhi*, p. 10.

³⁹ Huang Yunpeng, et al. *Sichuan caizheng lu*, p. 360.

⁴⁰ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 798.

⁴¹ Chengdushi difangzhi bianzhuān weiyuanhui, ed., *Chengdushi wujiazhi* (Record of commodity price in Chengdu) (Chengdu: Sichuan cishu chubanshe, 1998), p. 67.

region.⁴²

The transit taxes and commercial protection fees that individual military garrisons levied on goods passing through their regions were much heavier. As the silk reeling centers were usually cocoon producing centers and the non-mechanized workshops purchased cocoons from the local market, these were little affected by the transit tax on cocoons. Some filatures located in the sericulture centers, such as those in Leshan, had an abundant supply of local cocoons too. Only the filature in Chongqing had to purchase cocoons from distant sources and thus was heavily affected by the transit costs on cocoons. It is notable that there was not a single cocoon *hong* (*jianhang*) in Sichuan. The cocoon *hongs* were equipped with ovens used to dry cocoons, and sold the dried cocoons to the filatures and raw silk producers in the lower Yangzi.⁴³ Most cocoons that Chongqing filatures used were from Langzhong, Nanchong, Bishan, and their nearby regions. The filatures in Chongqing had to dispatch staff to the cocoon producing areas to purchase and dry fresh cocoons for each year's production needs. They set up cocoon purchasing stations (*jianzhuang*) during the cocoon seasons. Peasants and middlemen could sell cocoons at these stations, which often had cocoon drying equipment. After being dried, cocoons were shipped back to the factories in Chongqing. The transit taxes on dried cocoons ranged from 0.41 to 5.91 taels per picul, depending on the distance between the cocoon producing areas and Chongqing. The local military authorities

⁴² *Minguo Leshan xianzhi*, 1934, *juans* 4 and 7.

⁴³ Lillian M. Li, *China's Silk Trade*, p. 29.

sometimes levied commercial protection fees on cocoon drying stations too. Although the protection fee in 1926 could be as high as 4.98 taels per picul of dried cocoons, it was not levied everywhere.⁴⁴

In comparison with the lower Yangzi regions, cocoons were taxed less in Sichuan, and correspondingly, the processing costs were reduced. On average, the total taxes on a picul of dried cocoons to be processed and shipped to Chongqing in the mid-1920s were 4.98 taels. According to the same investigator, one picul of dried cocoons was charged about \$12.8 or 8.53 taels of taxes in Jiangsu, and about \$13.6 or 9.07 taels in Zhejiang at the time.⁴⁵ If cocoons were shipped to Shanghai, the cost was even higher. For every measure of cocoons required to reel one picul of raw silk that was shipped to Shanghai, about 55.39 taels of transit tax in total were incurred, in sharp contrast to 22.41 taels in Sichuan.⁴⁶ Therefore, in terms of tax costs on raw materials, filatures in Sichuan were actually less harassed by taxes than those in Shanghai, Jiangsu, and Zhejiang.

The raw silk incurred taxes when they were being transported. The majority of steam filatures were located in Chongqing, and nearby regions. These products entered the Shanghai international raw silk market through the Chongqing customs, and avoided the multiple transit taxes on transportation inside the province. From

⁴⁴ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 795.

⁴⁵ *Ibid.*, p. 215.

⁴⁶ *Ibid.*, pp. 352-354; and Lillian M. Li, *China's Silk Trade*, p. 167. It took about four to five piculs of dried cocoons to produce one picul of filature silk in Sichuan. Take the median, 4.5 piculs, and then the cocoon taxes for producing a picul of raw silk was estimated 22.41 taels in the mid-1920s.

the point where raw silk was shipped out from Chongqing to its arrival in Shanghai for sale, it cost about 48 taels. These included 3.00 taels for packing, 7.70 for export duty at Chongqing customs, 15.25 for shipping and insurance, 4.10 for coast trade duty and Shanghai landing expenses, 6.10 for warehouses and insurance, 3.20 for wharfage fees and the Huangpu River conservancy tax and other fees, and 8.70 for other business costs.⁴⁷

The second filature center of Sichuan was Leshan in southern Sichuan. Filature raw silk did not incur much transit taxes in Leshan, despite its distance to the treaty port of Chongqing. Raw silk producers adopted a postal system for the shipment of products. They sent out parcels of filature silk to Shanghai through the post office. Couriers of valuable commodities through the post office offered greater security than normal transportations, and became popular in the 1920s.⁴⁸ Every parcel of raw silk weighted 12.5 catties and cost \$7 for postage and tax. It was convenient, safe, and cheap. One picul of raw silk fetched about \$56 or 37.33 taels once it arrived in Shanghai.⁴⁹

Non-filature silk on the other hand was probably subjected to exploitative transit taxes by the garrisons, due to the distance between the producing areas and the markets. In 1925, the Chongqing Silk Guild complained that the transit taxes crippled raw silk transportation,

⁴⁷ Ibid., p.840.

⁴⁸ China Maritime Customs, *Returns of Trade and Trade Reports, 1923*, p. 6.

⁴⁹ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, pp. 838-839.

“Raw silk is critical to the retrieval of China’s rights and interests. The government had noticed this a long time ago, and enacted regulations to exempt fine raw silk from lijin levies. The government’s desire to promote sericulture has been widely known. However, in Sichuan in recent years, military incidents are numerous, and there are various forms of taxes and levies. The local garrisons have extorted taxes whenever cocoons are purchased. When silk is reeled and exported, many tax stations on the route impose other taxes under various names. It costs about more than \$60 [about 40 taels] to send a picul of raw silk out of the province. There are over 50 tax stations in total. As a result, silk dealers often lose money and cannot be engaged in economic activities. In consequence, the silk workers reeling silk, the women rearing silkworms, numbering millions of people, are suffering.”⁵⁰

The report further recounted that about 40 taels of tax was imposed on non-filature silk being transported out of Sichuan. This figure probably did not include the freight fees, duties, insurance, and other costs that were incurred after the shipment left Chongqing. Uehara Shigemi estimated that it cost 70 taels to export one picul of non-filature raw silk produced by the non-mechanized small frames is probably more representative.⁵¹

⁵⁰ “Chongqing siye gonghui kuaiyou daidian”, *Shuping zazhi*, 7 (June 1925). The majority of filature silk could avoid transit tax stations because of their specially location or special transportation, the report should refer to the non-filature silk that took long distance to arrive Chongqing to export.

⁵¹ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 838.

In comparison with silk reeling industries in other regions of China, the taxes that the warlord governments exacted from Sichuan silk was not particularly heavy. Neither Wuxi nor Shanghai filatures enjoyed significantly better tax policies than Sichuan filatures. It is recorded that, in the mid-1920s, it also cost about 38.46 taels of taxes to ship one picul of raw silk reeled in Wuxi to Shanghai. The Shanghai filatures had to pay taxes about 67.13 taels in total to produce a picul of raw silk.⁵² Furthermore, Furthermore, Lillian M. Li's estimation on total tax of raw silk in the lower Yangzi was about 5 percent.⁵³ My calculation was about 3 to 8 percent of the contemporary price of Sichuan filatures silk, similar to that in the lower Yangzi delta. As pointed by Li, this was not unbearable during the years under studying.

Works on the economy of Sichuan during the warlord period often cite an account of the taxes of Sichuan raw silk in 1930 as evidence of the burdensome taxes imposed by military authorities in the province.⁵⁴ In this document, the transit tax was considered the heaviest tax burden on silk goods and impeded the development of silk industry. Taxation on raw silk was levied again and again when passing through the areas guarded by different garrisons. Even within a single garrison, the shipment would be taxed repeatedly by different officials belonging to the garrison as it passes through their jurisdiction. This popularly-cited source material recounted that a picul of raw silk passed through four garrisons from Santai to Chongqing and was taxed

⁵² Ibid., pp. 352-354, 454.

⁵³ Lillian M. Li, *China's Silk Trade*, p. 184.

⁵⁴ For example, Sichuan jianshi bianxiezu, ed., *Sichuan jianshi*, pp. 260-261; Kuang Shanji and Yang Guangyan, eds., *Sichuan junfashi*, p. 364; and Zhang Youyi, ed., *Zhongguo jindai nongyeshi ziliao*, vol.3, pp. 138-139.

five times, paying about 130 dollars in total.⁵⁵ The tax burden in 1930 surely was more onerous in comparison to that in the 1920s in Sichuan, but the Sichuan silk industry was not the only recipient of heavy taxation in China. In the same year, taxes on raw silk in Wuxi county, Jiangsu, also amounted to over 100 dollars per picul.⁵⁶

There was heavy taxation on silk goods all across the country. The accusation that high taxation imposed by the warlords caused the underdevelopment of the Sichuan silk industry was too superficial. If the filatures in treaty ports such as Chongqing and Shanghai did not need to pay transit taxes on raw silk, they were charged taxes on cocoons because their urban location did not provide this essential raw material. If they had been located in sericulture centers such as Leshan and Santai in Sichuan, Shunde in Guangdong, and Wuxi in Jiangsu, they would have been charged with less cocoon taxes, but still had to suffer more transit taxes on the raw silk. Sichuan was not singled out as the worst case of the warlords' governance. A provincial report in 1934 suggests that the transportation conditions from Sichuan to Shanghai had increased the costs greatly, and disadvantaged Sichuan silk vis-à-vis silk from other regions. Even so, it also noted that Sichuan silk were taxed less than that in Guangdong, although it was still more than the case in the lower Yangzi regions.⁵⁷

Local Government and Elites: Limited Efforts of Technological Diffusion

⁵⁵ *Yinhang zhoubao* (Bank's weekly) 14, 50 (30 December 1930), miscellaneous, pp. 10-11, cited in Li Wenzhi, ed., *Zhongguo jindai nongyeshi ziliao* (Historical materials of agriculture in modern China), Beijing: Sanlian shudian, 1957, p. 138.

⁵⁶ Lynda S. Bell, *One Industry, Two Chinas*.

⁵⁷ "Gailiang Sichuan cansiye jihua" (Plan of improving sericulture in Sichuan), *Sichuan shanhou duban gongshu tuchan gaijin jihua* 1, 1 (1934), p. 73.

Although the military governments did not specially prohibit the development of the silk industry, they hardly encouraged it either. The situation led to dispersed and outdated promotional programs at the local level in Sichuan. During the first half of the Republic, sericulture promotional programs were designed and carried out by individual localities with very little involvement from the higher authorities. The influence of the central government could not penetrate into Sichuan, while the provincial government, if it was still functioning, showed little interest in technological improvement in sericulture. The lack of central planning and guidance limited the scale and quality of technological improvement in Sichuan. Regional technological development was left in the hand of the local elites. Technological improvements varied in areas, but were generally disappointing.

After the Manchu government collapsed, most institutions continued to exist, at least in name. The Provincial Bureau of Sericulture, which was supervised by the Intendant for the Encouragement of Enterprise in the Qing, was transferred to the charge of the Provincial Department of Construction. Meanwhile, the sericulture promotion centers remained in existence after the turbulence of the 1911 Revolution. In 1914, the provincial government required the local governments to continue running the sericulture promotion centers, while the counties that did not possess promotion centers should transform established sericulture societies into such promotion centers.⁵⁸ Later, these promotion centers' programs and activities were

⁵⁸ Sichuansheng difangzhi bianzhuan weiyuanhui, ed., *Sichuan shengzhi, sichouzhi*, p. 295.

merged with the educational activities of the sericultural offices belonging to each county's department of industry.

Before the 1940s, there was a lack of qualified government-sponsored advanced sericulture schools in the province. The Provincial Advanced Agricultural School (*Shengli gaodeng nongye xuexiao*) and the Advanced Sericulture Educational Institute (*Gaodeng canye jiangxisuo*) provided higher education in sericulture in Chengdu.⁵⁹ The Provincial Advanced Agriculture School was previously the Provincial Agricultural School founded by the Intendant for the Encouragement of Enterprise during the Qing. It offered a three-year program on sericulture from 1913 to 1926, but the department of sericulture was removed in 1927 when the school was merged with the University of Sichuan, and did not reopen until 1931.⁶⁰ The Advanced Sericulture Educational Institute was based on a sericulture teachers' school that was founded during the Qing. Both institutes had teachers educated in Japan. But to the disappointment of Japanese investigator Uehara, the two institutes had not remarkable achievements. He easily found maggots of parasite flies in the cocoons of the silkworm breeding stock of the Provincial Advanced Agricultural School, and noticed the silkworms reared in the Advanced Sericulture Educational Institute were weak.⁶¹

⁵⁹ Tian Wenbing, "Sichuan canye zhi jinkuang" (Resent condition of sericulture in Sichuan), *Xuesheng zazhi* 6, 6 (1921), p. 6; Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, pp. 858-859.

⁶⁰ Sichuan shengsichou gongsi, ed., *Sichuan sichou shiliao*, no page (section 4, chapter 5, part 2, vol. 1).

⁶¹ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, pp. 858-859.

Among the large number of sericulture counties, only a few conducted some tangible work on sericulture. These counties largely depended on silk production and often had influential figures to promote sericulture. I identify these figures as semi-official elites. They were of elite background, assumed certain civil government positions now and then, and were hardly separable from the officialdom. The easy transformation of identities was common in small and closely-knitted communities. Their identity as civil government officials, however, shall not be overstated, especially in this historical phase when military power was in real control. Their attitude towards technological diffusion was not affected by their positions. They sometimes joined the government and conducted reform projects with government subsidies, and sometimes carried out private technological improvement and diffusion projects even though the government did not recruit them.

Many social science studies have noticed the roles of local elites played in technological transformation in different Chinese regions. In his study in Kaixiangong village in Jiangsu Province, sociologist Fei Xiaotong found that the local leaders were vital in bridging outside sericulturists and local peasants. For economic benefits and social prestige, they actively supported the change. With the cooperation of the sericulturists, the provincial government, and the local leaders, technological transformation was significant in the village.⁶² Kenneth Pomeroy studies the inland Huang-Yun region in North China. In the case of spreading new cotton varieties, rural society in northern Huang-Yun received the new seeds easily because of lacking rural

⁶² Fei Hsiao-Tung, *Peasant Life in China*, chapter 12.

bosses. In contrast, in the southern part, the strong village elites opposed and obstructed the introduction of new seeds.⁶³

Local elites displayed their own characteristics in sericulture reform in Jingyan and Nanchong, two counties that elite-led diffusion was well recorded in Sichuan. Jingyan presents an example of how local entrepreneurs diffused sericulture technology during the period. It was one of the counties that were greatly reliant on income from sericulture. Here, Cheng Timing encouraged technological development through his personal efforts and endeavors as well as his official duties and activities. Cheng was a graduate from the Sichuan Provincial Agricultural School and was the pioneer in organizing the first private sericulture society in the county in 1909. In the 1910s, he owned the largest reeling workshops and was the leading silk industrialist of the country. He also raised funds among the local elites and set up the Bianlongxi Sericulture Society in his village in 1916. The society employed an expert from the lower Yangzi area to teach mulberry cultivation. The society had a plantation of 6,000 mulberries of a fine variety. These mulberries yielded leaves of a higher quality than native varieties, and in greater quantities as well. These were welcomed by silkworm raisers. Later, he cooperated with some other elites in the county seat to set up the Huying Sericulture Society near to the county seat. It boasted a larger plantation of over 11,000 fine mulberries. The society was a model for the cultivation of fine

⁶³ Kenneth Pomeranz, *The Making of a Hinterland, State, Society, and Economy in Inland North China, 1853 – 1937* (Berkeley: University of California Press, 1993), chapter 2.

mulberries and attracted many visitors.⁶⁴

From 1921, Cheng joined the county government to teach sericulture. Four sessions of the sericulture educational program were completed between 1921 and 1929, with 66 graduates. The curriculum included mulberry cultivation and field preparation, spring silkworm rearing, silkworm anatomy, silkworm egg production and examination, application of microscope, pupa killing, cocoon drying and storage, cocoon and raw silk examination, silk reeling and silk wadding making, and silkworm net and mount making. It could be seen that the curriculum was not different from that provided by the sericulture promotion center in the same county twenty years ago.⁶⁵

Under the leadership of Zhang Lan, private and governmental efforts to promote sericulture technology were the most active in Nanchong among all sericultural counties in Sichuan. Zhang was a native of Nanchong. He had a *xiucai* degree and studied in Japan. After he returned from Japan, he enthusiastically participated in local educational and political reforms. He was the chief leader of the railway-rights recovery movement, and his involvement won him great respect and trust within the province. His fame rose again when he pushed the campaign against Yuan Shikai. In 1917, when Sichuan was plunged into chaos because of the conflicts between Sichuan's troops and armies from neighboring provinces, Zhang was the

⁶⁴ Jingyanxian zhengxie wenshi ziliao weiyuanhui, ed., *Jingyan cansi yitiaolong*, pp. 14, 22.

⁶⁵ *Ibid.* p. 13.

only candidate for the position of Provincial Governor acceptable to both the locals and the Beijing government. Among all the governors of Sichuan from 1912 to 1937, he was the only civil governor who controlled no troops. He held so much influence that even Liu Xiang, the warlord who finally united Sichuan in 1933, had to show reverence to him.⁶⁶ After 1949, he became one of the first vice presidents of the People's Central Government in the People's Republic of China.

Although Nanchong was a traditional sericulture region, it was Zhang's leadership that elevated it towards becoming the leading sericulture center in Republican Sichuan. Technological development in Nanchong was slower than in Leshan and Santai at the beginning of the twentieth century. It did not adopt the use of small frames to reel raw silk until a Santai merchant introduced the practice in 1912.⁶⁷ When Zhang was in charge of the administration in northern Sichuan, he noticed the superiority of Japanese silk to Chinese silk. He sent Sheng Keqin and Wang Xingxian to study sericulture in Japan. Wang investigated for a few months and returned to suggest opening government supervised silkworm egg stations to improve the quality of eggs, while Sheng entered a sericulture school for further study.⁶⁸ Zhang, Wang, and other local elites set up the Guoshan Sericulture society in Nanchong in 1914.⁶⁹ This society recruited a large number of students and taught

⁶⁶ Xu Qingjian, "Sichuansheng kangdi houyuanhui qinli" (My experience of the Sichuan provincial supporting committee of resisting Japanese), *Chengdu wenshi ziliao xuanji* 16 (1997), cited in Feng Weigang, *Zhang Lan* (Biography of Zhang Lan) (Chengdu: Sichuan renmin chubanshe, 1991), pp. 163-164.

⁶⁷ Xie cheng and Li Renjie, "Nanchong cansi kaikuang", p. 55.

⁶⁸ Feng Weigang, *Zhang Lan*, pp. 83-84.

⁶⁹ Some source suggests the sericulture society was set up in 1913. See "Xi Zhihe"

them mulberry cultivation, silkworm rearing, and silk reeling. It cultivated 60,000 mulberries of fine varieties, introduced a Japanese variety of silkworms, and produced re-reeled silk.⁷⁰ Sheng and Wang were subsequently accorded high reputations in the history of the silk industry of Nanchong. Sheng in particular was later hailed as “the founder of the modern silk industry” of Nanchong.

After Zhang Lan was removed from his governmental post in 1920, local elites in Nanchong still looked up to Zhang as their leader. Zhang promoted local self-government based on the development of education and economy.⁷¹ He took up the position of president of the Nanchong Middle School in 1921. He later merged the vocational education system into the Middle School to provide students with both general education and vocational skills. The school included departments of general education, teacher’s training, medicine, agriculture and sericulture, and industry. The school was strong in sericulture education with a full range of sericulture equipment at its disposal. It even cooperated with a local silk and dyeing guild to set up a weaving factory.⁷² Sheng Keqin taught sericulture in the school.⁷³ The school’s capacity and fame for sericultural education contributed to its emergence as one of the leading advanced sericulture schools during the War of Resistance against Japan. It was believed that it was these promotional and

(Biography of Xi Zhihe), in *Sichuan shengzhi, renwuzhi*, ed., Sichuansheng difangzhi bianzhuan weiyuanhui, p. 407.

⁷⁰ Xie Cheng and Li Renjie, “Nanchong cansi kaikuang”, p. 55.

⁷¹ Feng Weigang, *Zhang Lan*, pp. 79-82.

⁷² Sichuansheng difangzhi bianzhuan weiyuanhui, ed., *Sichuan shengzhi, sichouzhishi*, pp. 301-302.

⁷³ Xie Cheng and Li Renjie, “Nanchong cansi kaikuang”, p. 56.

educational efforts that stimulated the general interest in sericulture in Nanchong during the Republic.⁷⁴ Later Sheng started investing in the silk reeling industry by setting up a small frame workshop and gradually upgrading the workshop into a full-fledged filature.⁷⁵ This was the beginning of filature silk production in Nanchong.

Even though technological diffusion in Jingyan and Nanchong proceeded in an incomparable manner, it was not without flaws. In Jingyan, the efforts demonstrate very little technological progress from the late Qing dynasty onwards. Even in terms of the number of trained students, these educational programs were too small in scale to influence local sericulture. In Nanchong, the most successful technological innovation introduced was the Japanese variety of silkworms that was locally called purple flowers because of the purplish tint of their cocoons. Even so, purple flower silkworms only became popular in the Nanchong region and was bred and reared by the traditional Chinese ways. Despite the emergence of a large number of small frame workshops, steam filatures appeared very late and in rather limited numbers. There was only one mechanized filature in Nanchong before the 1940s. It was the Liuhe filature established by Sheng Keqin in 1917. The filature was later merged with Tongde reeling factory that used the non-mechanized reeling devices.⁷⁶ During this period, the most prevalent type of device used for reeling raw silk in Nanchong and its nearby regions was the small frames.

⁷⁴ Ibid.; *Minguo xinxiu Nanchong xianzhi*, 1929, *juan* 11.

⁷⁵ Nanchong cansizhi bianzhuan weiyuanhui, ed., *Nanchong cansizhi*, p. 436.

⁷⁶ Nanchong cansizhi bianzhuan weiyuanhui, ed., *Nanchong cansizhi*, pp. 144-147, 436.

In such limited educational and technological conditions, it is hard to imagine that any influential and effective technological improvement work would be carried out in Sichuan during the first two decades of the Republic. The limited promotion efforts in Sichuan contrasted sharply with those in other provinces. The elementary educational programs that were carried out in Jingyan and Nanchong were more of the exception than the norm, and the quality of advanced sericultural education could not be assured. The public sericultural institutes were so insignificant that contemporary observers considered them as having almost existed in name only.⁷⁷ In contrast, their counterparts in other provinces, such as the Provincial Sericulture School of Zhejiang, the Hushuguan Girls' Sericulture School, the sericultural department of the University of Nanjing, and the Lingnan Agricultural College had made significant progress in sericultural reform, especially in the introduction and distribution of improved silkworm eggs that were disease-free. Moreover, after the Nationalist Government became established in Nanjing in 1927, the provincial governments in Zhejiang and Jiangsu dedicated much energy and support to sericulture and silk industry within their jurisdiction.

State disengagement was detrimental to Sichuan sericulture technological improvement in the 1910s and 1920s. The public sector largely neglected technological reform in the political disintegration and uncertainty. Unlike in the 1900s when provincial and local governments enthusiastically guided and supported technological diffusion, the local luminaries single-handedly managed it. But the

⁷⁷ *Ibid.*, p.736.

efforts of these individuals alone were not sufficient to fulfill the task of reforming sericulture and developing modern industry. Their influence was confined to their locality. Regarding the whole province in the two decades, the public promotional projects were rather limited.

Japanese: Diffusion of Mechanized Production

Although the Treaty of Shimonoseki granted foreign countries the right to establish factories in the treaty ports in 1895, the Japanese did not participate in silk production in Sichuan until after the establishment of the Republic. The arrival of the Japanese factories, despite its limited scale, directly impacted technological diffusion in the reeling industry in Sichuan. It spread the Japanese style of reeling and factory management, as well as making steam engines available to local purchasers.

Miyasaka Kurō started exploring the native products in Sichuan by setting up the Shinri Trading Company (*Shinri Yōkō*) in 1908. Chen Yaozhang was the comprador of the firm. Under the joint effort of these two individuals, the firm dominated the trade of Sichuan native products such as bristles and hides. In 1913, the firm participated in raw silk production by investing in the Yushin Filature. The Yushin Filature was a Sino-Japanese joint venture. Miyasaka, Chen Yaozhang, and You Shibo, a native bank owner, pooled together pooled 30,000 taels of capital. The company was registered and established in the Japanese concession of Chongqing in 1915. In the beginning, the Japanese held a dominant two-thirds of the shares, but the balance was soon disturbed in favor of the Chinese investors following their input of

another 60,000 taels in 1916. In 1924, Miyasaka and You were the highest authorities in charge of finance and trade, while another two Chinese were the production managers.⁷⁸

Despite the joint nature of the venture and the considerable Chinese stake, Japanese influence in the filature was strong. It adopted the use of both Japanese machines and management practices. Japanese staff controlled technological management in the filature. The chief technician was an expert from the National Sericultural Experimentation Station of Japan. Under him, there were three female teachers. There were additional Japanese technicians in charge of general affairs, cocoon boiling, and packing.⁷⁹

The firm had 116 Shinshu style reeling machines in 1915, and added 100 reels in 1922, and another 140 reels in 1923. These Japanese style reeling machines were more advanced than the Italian Tavelle reeling system that was adopted in Sichuan from the early twentieth century onwards. The early Sichuan entrepreneurs borrowed the Italian Tavelle system from Shanghai, where the system was popular. The raw silk was not re-reeled after it was finished on the Tavelle machines. The same basin was used for both cocoon boiling and silk reeling. It usually took a long time to boil cocoons which reduced productivity efficiency. Furthermore, the silk thread tangled easily in the boiling basin. Turbid cocoon boiling water also could affect the luster of silk by contaminated silk thread. The Japanese system separated

⁷⁸ Ibid., pp. 817-818.

⁷⁹ Ibid., p. 819.

cocoon boiling and silk reeling. It also added the step of re-reeling to reduce imperfection. In 1924, the Yushin Filature introduced mechanized cocoon boiling machines into Sichuan for the first time. The mechanized boiling machine was labor-saving by abolishing the child laborers who used to attend to the boiling basins at the reeling machines.⁸⁰ The Yushin Filature presented an example of more advanced reeling technology than the Tavelle system.

Later, the machine maintenance department of the Yushin Filature was split from the filature to form the independent Daishin Iron Workshop in 1921. It specialized in constructing reeling machines and boilers. Reeling machines produced by this factory was sold at low prices. It also helped filatures to design and construct plants. With the establishment of the Daishin Iron Workshop, local investors gained access to the cheap and convenient supply of Japanese style filature equipment.

Nearly all the Japanese style filatures in Sichuan appeared only after 1920.⁸¹ They were more or less related to the Yushin or the Daishin. A partner investor of the Yushin Filature, Chen Shaoyao, established the Fanjiang Filature in his hometown, Jiangjin county, in 1924. The Fanjiang Filature was modeled after the Yushin in terms of both technology and management.⁸² Similarly, the Tongde Filature in Nanchong was also founded by people who were closely related to the Yushin Filature. Some

⁸⁰ Ibid., pp. 817-819.

⁸¹ According to *Shina sanshigyō taikan*, another Japanese style filature was set up in Wanxian in 1916. It is possible that filature was a Japanese owned filature because at the time, Japanese style filature was not known to Sichuan natives yet. However, it is impossible to detect the ownership of the filature in Wanxian now due to lack of more information about it.

⁸² Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 824.

previously non-mechanized workshops were transformed into a Japanese style filature by purchasing reeling machines from the Daishin Iron Workshop, and introducing Osaka-produced boilers and generators. The filatures that relied on the Tavelle system also tried to imitate the Japanese system. The Daishin Iron Workshop undertook the task of transforming the Lihua Filature, which had previously used the Tavelle system, into a Japanese style filature in 1924. The Tavelle Huaxing Filature also purchased one Japanese boiling machine although it did not adopt the Japanese system.⁸³ In fact, the majority of the filatures set up in Sichuan during the 1920s followed the Japanese model. The reels in Japanese-style filatures accounted for about 35 percent of the total reels in all kinds of filatures in Sichuan in 1926.⁸⁴

Conclusion

Despite the disorder brought by the rampant wars and warlordism, sericulture in Sichuan experienced growth in output and export in the 1910s and 1920s. This growth was not driven by direct official guidance and intervention. There was no centralized government to carry out large scale reform programs, but the warring warlords and the military garrisons did not handicap technological development in spite of their ignorance on sericultural matters. Although high taxes were imposed on sericulture, especially on cocoons and raw silk, it is also notable that high taxes on the silk industry were imposed across China at the time. High taxation costs were not

⁸³ Ibid., pp. 825-830; Zhongguo gongchengshi xuehui, ed., *Zhongguo gongchengshi xuehui Sichuan kaochao baogao* (Report on the investigation on Sichuan by the Chinese Institute of Engineers) (Zhongguo gongchengshi xuehui, 1935), vol. 7, p. 18.

⁸⁴ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, pp. 773-774.

exclusive to the silk industry and hence, did not necessarily destroy the Sichuan people's enthusiasm for participating in it.

Limited improvements and reform programs were carried only by local communities that depended on income from sericulture and silk industry, and by the influential elites who were capable of leading and encouraging reform. Both the technological factors and the impact of these reforms however were unsatisfactory. They hardly exceeded beyond the knowledge and skill that had been introduced and spread into Sichuan previously. Furthermore, it hardly reached a significant number of producers.

In contrast, the presence of Japanese factories brought before the local investors a new model of silk reeling industry. The success of Japanese filatures popularized Japanese-style filatures in Sichuan, especially during the 1920s. The establishment of a Japanese machinery factory made modern silk reeling equipment accessible to local investors. It is notable this influence had little relations to "imperialism". The Yushin Filature had no special advantages over Chinese filatures. Japanese and Chinese producers were both charged the same rate of taxation and faced the same competition in the international markets. It is arguable that the Japanese "imperialism" was ironically beneficial to the technological improvement and diffusion in Sichuan in the 1920s. The Japanese's technological contribution was even more significant than that of the provincial and local governments in Sichuan then.

CHAPTER SIX

Technological Choices in the Silk Reeling Industry

The growth in output levels of Sichuan raw silk during the Republican era was characterized by the use of a wide range of production methods on different technological levels. These technologies ranged from the simple traditional reeling frames to the relatively advanced Japanese style reeling factories, with non-mechanized methods and techniques in predominance. Unlike in coastal China where the export of filature silk had overtaken the export of domestic silk in the Western markets by the turn of the twentieth century, the Sichuan silk industry stagnated during the transition from traditional reeling machines to modern steam filatures. The steam filature had arrived in Sichuan later than in the coastal regions by over thirty years, and was spread only in limited number and scale. All filature silk went to the Western market, but never exceeded the amount of non-filature silk in the export of Sichuan raw silk. The non-mechanized production was in pre-dominant in terms of both the number of firms and output of silk.

Why did raw silk production in Sichuan not become mechanized as it had in Shanghai, Wuxi, and Shunde? The mechanized production of raw silk was available in China from the 1860s. The adoption of mechanization was more of a private decision of investors than a government directive from the top. The attitude of the authorities towards sericulture, especially raw silk production, in the 1910s and 1920s can be

described as neither supportive nor obstructive. On the one hand, there was no governmental encouragement at the time. On the other, the authorities did not significantly obstruct the growth of sericulture and silk industry through taxation. Instead, the more important factors that affected technological choices were the economic considerations of the private investors.

In a brief description of Sichuan sericulture, Lillian M. Li attributed the state of reeling technology to market forces. Producers produced for different markets that required different standards of product quality. Sichuan was the largest supplier of yellow silk. The market for yellow silk protected it from competition in the Western market. At the same time, the majority of Sichuan silk was consumed within the province or went to the tropical counties. Looms in these regions did not require better silk that would require technological improvement to produce.¹

This chapter further argues that supply factors contributed to the different technological choices of investors in Sichuan in the 1910s and 1920s. It first describes the wide range of reeling technologies adopted in Republican Sichuan, before proceeding to examine the economic reasons that affected the choice of technology. Economic rationality directed technological choice. In contrast to the non-mechanized workshops, industrialization of silk reeling was capital-intensive but not labor-saving. After taking into account cocoon costs, wage costs, interest rates, and production efficiency, cost-benefit analyses shows that mechanization were not

¹ Lillian M. Li, *China's Silk Trade*, pp. 115-118.

much economically superior to non-mechanized workshops in saving costs and increasing profit.

While there were very few primary sources on sericulture in Sichuan in the 1910s and 1920s, Japanese researcher Uehara Shigemi had conducted a detailed survey on the topic in 1926. He studied at the Tōa dōbunkai in Shanghai and spent about five years travelling in China, including 50 days in Sichuan in the spring of 1926. Lillian M. Li considers Uehara's research "the most complete and reliable of all the compendia dealing with sericulture in China."² In reality, it was the only detailed and reliable source on Sichuan in the 1920s. Hence, it makes possible the comparative study of sericulture between Sichuan and other Chinese sericulture centers.

Various Technological Levels in Raw Silk Reeling

Mechanized and non-mechanized modes of production coexisted in Republican Sichuan. There were technological differences as well among the methods and equipment that could be categorized in each of these two modes. Mechanized production featured two different filature models – the Italian Tavelle reeling system and the Japanese style system. Non-mechanized technologies included two major types of reeling equipment and a reeling technique. They were the large frame that produced domestic silk, the small frame (also called wooden frame, *muché*), and the method of domestic silk re-reeling (*yaojing*). The mechanized filatures and small frame both appeared in the twentieth century. Silk produced by the two techniques

² *Ibid.*, p. 98.

was called improved silk in Republican China. Silk re-reeling technology had been known in Sichuan for long, but only became popular after the twentieth century. The large frame was traditional rural technology. They produced silk of relatively inferior quality. Mechanized production was the most advanced silk reeling technology in Sichuan. The process depended on the use of machines that were also called iron machine (*tieji*), because the machine was made of iron. Machine-made raw silk was called filature silk. The first steam filatures appeared in Sichuan in the 1900s. They adopted the Italian Tavelle reeling system that produced raw silk without re-reeling. As this technology was borrowed from Shanghai, the filatures that adopted it were known locally as Shanghai style filatures. The Japanese style filature emerged in Sichuan in the 1920s. This system separated cocoon cooking and reeling as two procedures in different shopfloors, and re-reeled raw silk, which yielded better quality silk. It was the most advanced technology adopted in the reeling industry in Sichuan at that time. Steam filatures were primarily concentrated in the treaty port of Chongqing. Leshan ranked as the second filature center after Chongqing. The output of filature silk was 10 to 15 percent of the total output of raw silk in Sichuan.³

In comparison with filatures in coastal China, the filatures in Sichuan had distinct characteristics. First, there were few filatures in Sichuan. In the 1930s, there were 107 filatures in Shanghai, 81 in the lower Yangzi region except Shanghai, 121 in Guangdong, and only 20 in Sichuan.⁴ The total number of steam filatures in Sichuan

³ Xu Xinwu, ed., *Zhongguo jindai saosi gongyeshi*, p. 247.

⁴ Kubo, Toru, *Chugoku Keizai 100 nen no Ayumi* (A Hundred Years of China's Economy) (Kurume: Souken Shuppan, 1995), p. 22.

was less than that in Wuxi county alone, where there were 42 filatures in 1930.⁵ While filature silk formed the largest share of raw silk output in Shanghai, Wuxi, and Shunde, it accounted for only a small portion of the total output of raw silk in Sichuan.

Second, reeling technology kept developing despite the limited amount of filatures in Sichuan. The percentage of reels in Japanese style filatures was 40 percent of the total number of mechanized reels in Sichuan in the mid-1920s.⁶ It was much higher than that in Shanghai, Wuxi, and Guangdong. Shanghai filatures stayed with the Tavelle system, which was less advantageous than the Japanese style. Mechanized silk reeling in Guangdong was even less advanced than that was in Shanghai. The Tavelle system was not introduced in Guangdong until the late 1920s.⁷

Third, the ownership and management of filatures in Sichuan was not separated. In Shanghai and Guangdong filatures, the filature silk production popularly adopted factory rental system. This system was chiefly responsible for the slow technical change and catching up in the two regions. Filature owners established factory and set up equipment, and then leased out factories to the operating firms. The owners had no interest in profit and did not concern upgrade. The operating firms rented factories for saving cost and did not invest in the equipment that did not belong to them. The separation of ownership and management therefore prohibited the

⁵ Lillian M. Li, *China's Silk Trade*, p. 167.

⁶ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, pp. 773-774.

⁷ Chen Ciyu, *Jindai zhongguo de jixie saosi gongye*, pp. 95-96, 176-178.

improvement of filatures in Shanghai and Guangdong.⁸ This certainly was not an obstacle to filatures to Sichuan, where the owners were also managers. Sichuan filature investors profited from the final products and the efficiency of equipment had to be an essential part of their concern.

The large frame was the most outdated but the most widely spread reeling device in Sichuan. It was a treadle-operated device. Many rural household reeled raw silk from their own cocoons through this device at home. Some workshops also set up several frames together and hired workers to operate these. The large frame is a simple device. Its stove was made of mud and bricks. On top of the stove, a large iron pot with a mouth one meter in diameter was set up. A reeling frame with a simple structure was placed on the iron pot. A reel was placed at the right side of the stove. The sizes of the reels differed across regions but were all significantly large. The circumference of the reel was about 3.7 to 4 meters. The large reel won for the entire set-up the name 'large frame'. Operators, normally men, stood in front of the frame and pressed the treadle with his right foot to run the reel. At the same time, their hand stirred the boiled cocoons in the pot with a pair of chopsticks. The loosened ends of silk filaments from several cocoons were twisted into a skein and passed through the eyelets on the reeling frame and finally onto the reels. It was easy to construct such reeling frames with materials that were produced locally. The large frames produced uneven and coarse silk that was also made rough with the addition

⁸ Lillian M. Li, *China's Silk Trade*, pp. 172-173; Robert Y. Eng, *Economic Imperialism in China*, p. 76.

of extra filaments. The silk was called domestic silk, and accounted for over half of the total output of raw silk in the province in the mid-1920s.⁹

Domestic silk was the raw material for the creation of re-reeled domestic silk (*yaojingsi*). In re-reeling workshops, domestic silk was first sorted according to fineness and color, and then re-reeled onto smaller reels. During the re-reeling, the worker let the silk thread pass through his or her fingers. When the worker felt a change in fineness, he or she cut the thread and reeled it onto another reel corresponding to its fineness. Re-reeling could correct some disadvantages of domestic silk, such as unevenness and coarseness. There were seven categories of fineness. The first four categories were good enough for export, but the quality was still not as good as the silk produced by small frames and filatures. This kind of silk was mainly produced in regions where domestic silk production was thriving, including Leshan and Hechuan.¹⁰

The small frame or wooden frame represented a significant improvement of the traditional reeling technology. As its names indicate, it differed from the large frame in utilizing a small reel, and was distinguished from the mechanized iron machines due to its wooden structure. The frame was made of wood. Its reel was only about one meter in circumference. It resembled steam-powered machines in function. Like

⁹ Sichuansheng difangzhi bianzhan weiyuanhui, ed., *Sichuan shengzhi, sichouzhi*, p. 133; Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 853; and Wang Zhuangmu, *Minguo sichou shi: 1912 – 1949*, pp. 131-132.

¹⁰ Wang Zhuangmu, *Minguo sichou shi: 1912 – 1949*, pp. 132-133; Sichuansheng difangzhi bianzhan weiyuanhui, ed., *Sichuan shengzhi, sichouzhi*, p. 135; Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, pp. 774-775, 850-852.

the mechanized reeling machines, the types of small frames could also be divided into a non-re-reeled system that was modeled after the Italian system, and a re-reeling system, which was similar in the Japanese style reeling system and could produce better silk than the non-re-reeled one and gradually became dominant. It soon became common practice to reel raw silk onto small reels and then re-reel the thread on large reels in the early twentieth century.¹¹ The productivity of the small frame was further increased with the multiple-reel frame invented by a student in the Sichuan Sericulture Society in 1907. The various versions of small frame were all upgrades of traditional devices, but did not develop into mechanization. The quality of silk was better than that of domestic and re-reeled domestic silk, but inferior to filature silk. The small frame reeling workshops operated seasonally, usually for two to three months after fresh cocoons came into the market. Uehara estimated the total annual output of these factories to be around 3,500 piculs.¹² Of the 3,500 piculs, about 2,000 were produced in Santai, the county where Chen Wanxi introduced and actively encouraged the adoption of the device. Another Japanese source estimated that the highest annual output in Santai and its nearby regions was over 6,000 piculs.¹³

The highly diversified technological levels reveal the technological

¹¹ Yin Liangying, *Sichuan canye gajinshi*, p. 45; Wang Zhuangmu, *Minguo sichou shi: 1912 – 1949*, p. 133; Xu Xinwu, ed., *Zhongguo jindai saosi gongyeshi*, pp. 241-242; and Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, pp. 771-772.

¹² Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 772.

¹³ Masao Kanda, *Shisen-shō sōran* (Survey of Sichuan) (Tokyo: Kaigaisha, 1936), p. 503.

transformations in modern Sichuan, but the transition was far less than complete. Even though the introduction of mechanization through the Italian Tavelle system and later the Japanese style system meant that silk reeling had become even more advanced than that in Shanghai in the 1920s, the dominance of non-mechanized reeling technology demonstrated that the overall technical level in Sichuan fell far behind that in Shanghai, Wuxi, and Guangdong. Sichuan factories were innovative in adjusting and accommodating technology that combined characteristics of both mechanized and non-mechanized technologies, but still lacked the dynamics of complete industrialization. As observed by Lillian M. Li, “silk production there occupied an intermediate stage between domestic handicrafts and mechanized factory production.”¹⁴

Cocoon Cost

Cocoons formed the largest cost in producing raw silk. Cocoon prices varied according to quality, output, and region, but were generally low in Sichuan. This was one essential advantage of raw silk production in Sichuan. To yield one picul of raw silk, four to five piculs of dried cocoons were needed. About three piculs of fresh cocoons yielded one picul of dried cocoons. In 1925, the price ranged from \$40 to \$60. In Leshan, a picul of yellow cocoons in 1925 cost \$50, while white cocoons cost \$40. In 1926, the average price of cocoons was about \$60 to \$70 per picul. The subsidiary character of silkworm rearing in the rural economy contributed the low

¹⁴ Lillian M. Li, *China's Silk Trade*, p. 116.

price of cocoons. Uehara calculated that the production cost of producing cocoons were nearly equal to their selling price. Because peasants planted mulberries on excess pieces of land, and raised silkworms with their own labor and primarily their own leaves, they had minimum cash input. Although the marginal profit was low because of the low selling price of cocoons, peasants still received some cash profit. Furthermore, Uehara noticed that peasants were much less inclined to adulterate the cocoons they sold with inferior cocoons than in Jiangsu.¹⁵ Reeling firms benefited from this good practice in Sichuan.

The good quality and low prices of cocoons largely reduced cocoon costs in silk production. The following table is the breakdown of expenditure on producing one picul of filature silk. 76.7 percent of the total production costs in filatures in Shanghai were spent on cocoons, 69.5 percent in Guangdong, and only 62.8 percent in Sichuan in 1926. In terms of the cocoon cost for producing one picul of raw silk, the disparity is even more striking: 986 taels in Shanghai, 858 taels in Guangdong, and only 608 taels in Sichuan. Such low expenditure on cocoons undoubtedly made Sichuan raw silk competitive in the market.

TABLE 4 Estimated cost of producing one picul of filature silk¹⁶

Place	Shanghai		Sichuan		Guangdong	
Cocoons	986 taels	76.7%	608 taels	62.8%	858 taels	69.5%
Wage	115	8.9	105	10.9	232	18.8

¹⁵ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, pp. 781, 793-794.

¹⁶ *Ibid.*, pp. 31-32.

Fuel	56	4.4	42	4.3	63	5.1
Interest	30	2.3	75	7.8	20	1.6
Miscellaneous	71	5.5	125	12.9	37	3.0
Total	1,286	100	968	100	1,234	100

Both non-filature workshops and steam filatures shared the advantages of low cocoon prices, but the non-mechanized firms benefited more from the advantages. To produce one picul of raw silk, it required more cocoons in filatures than in non-mechanized firms. The criterion of fineness on steam filature silk meant that any uneven thread was discarded, and longer thread was needed to weigh the same amount of coarse silk. The filature also spent more on miscellaneous costs that accompanied the purchase of cocoons. Most filatures were located in Chongqing, which was not a cocoon producing region. Filatures had to dispatch staff to set up cocoon purchasing stations and drying stations in the cocoon regions. When dried cocoons were transported back to Chongqing, they incurred various fees and transit taxes imposed by the military authorities that controlled different areas. In contrast, non-steam filature firms were often located within the sericulture center and many even reeled raw silk from fresh cocoons in rural households.¹⁷ The estimated costs of the cocoons required to produce one picul of filature silk was 608 taels, while 500 taels worth of cocoons could produce the same amount of raw silk in small frame workshops in the mid-1920s.¹⁸

¹⁷ Masao Kanda, *Shisen-shō sōran*, p. 504.

¹⁸ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, pp. 31-32, 838.

Wage Costs

In addition to the low cost of raw materials, the wage levels in the reeling industry in Sichuan were kept low. There were two types of employees – the apprentices and the hired skilled workers. This was different from the practice in coastal China where hired female workers were the major labor force of the silk industry.

The apprenticeship system was popular in both filature and non-steam workshops in Sichuan. It is not hard to understand why the non-steam workshops continued the traditional apprenticeship approach. Many steam filatures did not give up the system either, although the factories relied on modernized systems and equipment. Filature owner Chen Wanxi considered that the apprentice system was a better approach for training skillful workers than the female workers' recruitment system prevalent in Shanghai.¹⁹ The apprenticeship system ensured a close relationship between factory owners and workers. It also helped to set up a stable workforce because the apprentices were personally attached to the factory owners.

More importantly, the apprenticeship system allowed the workshops and factories to keep wages low. In one filature in Nanchong, the most skilled apprentices were each given only 50 wen with boarding in the factory. Filature apprentices had a daily salary of 100 cash in Langzhong. Apprentices' salaries were also 100 wen daily

¹⁹ Chen Kaizhi, *Quansangshuo*, p. 4.

in the reeling workshops in Santai.²⁰ Considering the entire province, the highest paid apprentices were in Leshan, where they received accommodation and food, plus 200 wen. The non-boarding apprentices in Chongqing received 500 wen or 9 cents a day, but had to take care of their own accommodation and food themselves. In workshops in northern Sichuan, some apprentices were given as low as 30 wen or 0.6 cent per day, or 10,950 wen a year.

The apprentices' average wage was even lower than many agriculture workers in the province. In Nanchong, besides food provided by his employer, an agricultural day-laborer was given 400 wen daily. In Langzhong, excluding food, a day-laborer's cash income was 500 wen. The market price of a bowl of porridge was 100 wen, and a bowl of steamed rice about 200 wen. Hence, including food, an employer in these places had to spend 1,200 wen or more to hire an agricultural day-laborer.²¹ The agricultural year-laborers were the worst paid among the agriculture workers, receiving 50,000 to 80,000 wen per year.²² The apprentices were only slightly better off than the agricultural year-laborers.

The skilled workers in filatures were not much better treated. Unlike the popular practice of daily wages in the filatures in other parts of China, silk reeling workers in Sichuan were paid according to their productivity. Cash penalties and rewards were

²⁰ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 800.

²¹ Ibid., p. 767.

²² *Chinese economic weekly* 286 (14 August 1926), p. 101, cited in Zhang Youyi, ed. *Zhongguo jindai nongyeshi ziliao* (Historical materials of agriculture in modern China) (Beijing: Sanlian shudian, 1957), p. 458.

strictly enforced in these filatures to ensure the fineness of raw silk. However, due to the quality of cocoons and the condition of machines, it was hard to maintain the level of fineness. Punishment was common even for a skilled worker. The average salary of male workers in the Japanese style Yushin Filature in Chongqing in December 1925 was 21,486 wen per month. Divided by 28 working days, the daily wage of all reeling workers was 767 wen. It was only slightly higher than the agricultural day-laborers. The average daily wages of female workers was 752 wen in the Yushin Filature.²³ Female workers were given 970 to 1,130 wen per day in the filatures using the Tavelle system at the time. Because these workers had to prepare their food and accommodation, the daily salary in Tavelle filatures was even lower than that of agricultural day-workers. In comparison with other regions in China, the daily wage of women workers in filatures in Shanghai was double of that of their Sichuan counterparts. Wages in Guangdong were even much higher during the same period.²⁴

In the non-filature silk producing firms, the wages of workers were also kept at the lowest level. In small frame workshops in Santai and Mianzhou, reeling workers were given 60 to 80 wen for every *liang* of silk produced, and plus food every day. Normally, a worker could earn 480 to 640 wen a day, which was lower than the over 750 wen that skilled workers in filatures earned daily. In the re-reeling workshops, skilled workers earned 160 wen for every *liang* of silk re-reeled in Hechuan, 75 wen in

²³ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, pp. 806-809.

²⁴ Chen Ciyu, *Jindai zhongguo de jixie saosi gongye*, p. 230, 232.

Mianzhou, and as low as 50 wen in Leshan. Few could re-reel over 10 liang a day. Domestic silk reeling by large frame was normally conducted in individual peasant family, but there were also small scale workshops in which male workers were employed. Wages on a per-piece basis saw workers being paid 60 wen for one liang of raw silk.²⁵

The low labor cost was a result of overpopulation in the province. There were few job avenues for the large rural population in the overpopulated province. Even though there were some traditional industries such as salt production and mining that absorbed quite a few landless laborers, the majority normally found jobs as agricultural laborers, and domestic servants. To become long-term agricultural laborers or domestic servants meant to lose their freedom and to be personally attached to the employers, while daily based work offered little stability. For women, the opportunities of getting a job were much fewer. Therefore, when there was no opportunity cost, or when opportunity cost was equal, many people joined the factory workforce even though the salary was extremely low.

All kinds of reeling firms benefited from the low wage costs, but non-mechanized workshops spent even less on wage costs than in filatures. It is worth noting that steam filatures in China were labor-intensive. According to a survey on filatures in Wuxi in 1940, about 2 to 3 people were required to attend to each steam reel.²⁶ This high employee-machine ratio was also prevalent in

²⁵ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 836, 851-853.

²⁶ *Mushaku kōgyō jittai chōsa hōkokusho* (Survey on the industry in Wuxi) (Minami

Republican Sichuan. The Huaxin Filature had about 1,000 workers and 360 reeling basins. The ratio was as high as 2.78:1.²⁷ In the Yushin Filature that adopted Japanese style production and management methods, there was also a tendency to hire excess personnel.²⁸ In contrast, the small frame workshops in Republican Nanchong normally needed only 1 to 1.5 people to attend to each reeling device. Very few boasted of a ratio over 2 workers to one machine.²⁹ At the same time, the wages of both apprentices and skilled workers were higher in filatures than in non-mechanized firms. Furthermore, more staff was required in departments in filatures that traditional workshops did not have, such as steam machine engineers and administrative staff, who were highly paid professionals.

Investment and Interest Rate

Mechanized filatures were expensive investments that the majority of raw silk production investors could not afford. Filature owners had to possess sufficient capital to found a factory. The investment on the equipment, infrastructure, and buildings of a filature was much larger than that on any other kinds of reeling workshops. The Japanese style Fanjiang Filature was set up with 100,000 taels and 280 reels in 1924. Another filature with 240 reels has an initial capital outlay of

Manshū Tetsudō Kabushiki Kaisha Chōsabu, 1940), p. 666, cited in Chen Zhen, ed. *Zhongguo jindai gongyeshi ziliao* (Historical materials of industry in modern China) (Beijing: Sanlian shudian, 1961), p. 106.

²⁷ Zhongguo gongchengshi xuehui, ed. *Zhongguo gongchengshi xuehui Sichuan kaochao baogao*, vol. 7, p. 18.

²⁸ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 820.

²⁹ Nanchong cansizhi bianzhan weiyuanhui, ed., *Nanchong cansizhi*, pp. 144-146.

80,000 taels. The investment also meant a large sum of interest. In contrast, for a non-mechanized reeling workshop, it cost only three dollars or a little more than two taels to set up a small reeling machine.³⁰ Even for a non-mechanized workshop with as many as 300 reels, it requires less than 1000 taels to set up the equipment.

At the same time, the larger the enterprise, the greater was the demand for the accumulation of raw materials and the need for a substantial working capital. Unlike in coastal China where the ownership and management of a filature was separated, thus reducing the financial burden of the investors, Sichuan filatures owners not only needed to obtain fixed assets like factory sites and machinery, but also had to prepare large sum of working capital to acquire cocoons. The seasonal nature of the cocoon market in Sichuan meant that producers had to procure cocoons once a year. Except for a very small amount of summer crop of cocoons in certain regions, the spring crop of cocoons was the dominant crop in the province. The Sichuan reeling firms could not obtain fresh cocoons on demand as their counterparts could in Guangdong, where cocoons were harvested several times every year, or purchase dry cocoons from cocoon hongs whenever necessary as Jiangsu and Shanghai filatures did. The raw materials for the entire year's production needs had to be acquired within the short cocoon season. The larger firms needed more capital to procure the raw materials. However, the investment on raw materials would not bear returns until the final product was sold. It was a serious test on the financial strength of the reeling firms.

³⁰ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, pp. 824-825, 838.

For example, the Huaxin Filature in Leshan produced 300 piculs of raw silk annually. Given the average cocoon cost in Sichuan filatures in 1926, which was 608 taels for producing a picul of raw silk, 132,400 taels was needed to procure enough cocoons for the production of 300 piculs of silk. This amount fluctuated annually depending on the cocoon prices. Even small frame workshops had to invest large sum of money on cocoons. It was estimated that there were about 8,050 small frames in the whole province with an annual output of 3,500 piculs of raw silk. On average, every frame produced 0.434 piculs of raw silk. Uehara estimates that about 500 taels of cocoons were required to produce one picul of raw silk using the small reeling frame. Therefore, each reeling frame consumed 217 taels of raw materials. Even a small workshop with only five frames had to prepare over 1,000 taels for the procurement of cocoons.

The capital spent on cocoon purchase were either saved from previous years' revenue or borrowed from the credit market. During the cocoon seasons, although loan interests were much higher than usual, it was still hard to get the loans. For instance, in Santai, the usual interest rate was about 1.5 percent per month, but during the cocoon season, the small frame reeling firms had difficulty borrowing money at monthly interest rates as high as 2 to 3 percent.³¹ It took a long time for the capital invested in the cocoons to be returned as profits on the sale of raw silk, which ultimately led to high interest costs, the major disadvantage of operating a reeling business in Sichuan.

³¹ Masao Kanda, *Shisen-shō sōran*, p. 505.

Moreover, unlike non-mechanized workshops, steam filatures normally did not leave their expensive machines idle. Due to rational economic consideration, owners did not cease production unless the expenses of production exceeded the profits. As long as they still made money, factories continued running. In the 1910s and 1920s, the raw silk market was generally satisfactory and promising. Heavily equipped steam filatures owners certainly wanted to keep the factories running yearlong, despite the high interest rate. This meant that the filature investors had to prepare a huge sum of capital to procure sufficient cocoons to last the entire production year. The duration of operations in the non-mechanized workshops was more flexible, because leaving the reels idle and closing workshops did not bring heavy financial losses. Many only operated several months after the cocoon season of the year, depending on the availability of raw materials and market demand.

Production Efficiency

In the long process of world industrialization, there was a rising productivity through mechanization. But this was not true in the case of the mechanized production of raw silk in Sichuan in the 1920s. Uehara recorded the productivities of different filatures in Sichuan. In comparison with that in the lower Yangzi, the rate was low. In the filatures in Chongqing, one steam reel could produce nine liang of silk daily from the finest cocoons that were produced in Santai. However, if the filature uses cocoons produced in other regions, the daily yield was far beneath this level, amounting to merely 4.5 to 5 liang per reel. The filatures in Leshan used locally

produced cocoons that were inferior to those of Santai, but better than cocoons from other regions. One reel could produce seven liang of silk.³² In contrast, the normal output was 11 to 12 liang per reel in filatures in the lower Yangzi. The lowest yield in the lower Yangzi, namely 8 liang per reel, would be actually considered as quite a high rate if compared to the productivity of Sichuan filatures.³³ In terms of productivity, Sichuan filatures could not compete with their counterparts in other regions, and were not superior to the non-mechanized workshops. In the small frame workshops, one reel could produce 5 to 10 liang of raw silk daily. The large frame reeling device produced an even higher amount of raw silk, generally over 10 liang, or even as high as 30 liang.³⁴

Cocoon quality was largely responsible for the low efficiency of reeling machines. Before the silk thread was taken off the cocoons, they had to be boiled to remove the gum that determines the efficiency with which the thread could be extracted – the reelability rate. Low reelability rates increased silk waste, reduced the yield and quality of raw silk, and caused low labor efficiency. For example, it took five minutes to remove gum from cocoons in Santai and its nearby regions, but 20 minutes from the Leshan variety, because the latter had very low reelability. Most cocoon varieties that Uehara investigated in Sichuan in the 1920s had the problem of low reelability rates. Furthermore, low reelability had actually more effect on steam filature silk

³² Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, pp. 778-781.

³³ Lillian M. Li, *China's Silk Trade*, p. 30.

³⁴ Hosie, *Report by Consul-general Hosie on the Province of Ssuch'uan*, p. 60; Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 853.

than non-mechanized one. The higher the automation level, the lower the reelability rate required.

Profits

The comparison demonstrates that even in terms of profit, the filatures were not significantly more profitable over non-mechanized workshops in the 1920s. Among all the kinds of Sichuan-produced raw silk filature silk enjoyed a good reputation and fetched the highest prices in Shanghai. The average price for Sichuan filature silk from 1920 to 1926 was around 1,000 taels. In 1922 and 1923, silk from the Yushin filature was sold for as high as 1,214 and 1,314 taels respectively. Nevertheless, after deducting the expenses, the profit for filature silk was actually not significant. For example, the net profit per picul of raw silk from the Yushin Filature in 1925 was 116 taels.³⁵

Non-mechanized workshops received rather similar profit levels. The estimated production and trading cost of one picul of silk produced by the small frame in the mid-1920s was 650 taels. The market price in Shanghai for non-filature raw silk was about 750 to 800 taels per picul, generating hence a profit of 100 to 150 taels per picul.³⁶

³⁵ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 849. The net profit was 46,405 taels and divided by 400 piculs of raw silk in 1925.

³⁶ There was not accurate price of small frame machine-made re-reeled silk. According to Uehara, the price was 200 taels lower than filature one. Hence I made the estimation of 750-800 taels based on filature price at the same time. See Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 838.

The customs report also shows a narrow margin of prices between the filature silk and re-reeled silk in Sichuan. For instance, filature yellow silk passing through Chongqing customs was worth 648, 476, and 634 taels per picul respectively during the three years from 1918 to 1920, while re-reeled silk was valued at 536, 411, and 565 per picul for the same three years.³⁷ Such narrow margins probably discouraged the majority of investors from investing in mechanization.

In addition, the profit generated from the reeling business was not attractive to investors who expected generous returns from their capital. Only those who were financially strong could establish steam filatures. Investment in the silk industry would not have been a favored choice for the quick generation of high revenue. Investment in the financial market, such as through speculation on Shanghai exchange rate, was more attractive.

In terms of risk, the filature industry was also more dangerous than investment in land. There was a trend of re-investing profit from industry and commerce on land in Republican Sichuan.³⁸ The price of land increased significantly from 1916 under the tide of land purchases.³⁹ This made land investment a preferable hedge. Furthermore, even though the return from land investment was not as good as the best return rate from industry and commerce, but it was not as unstable either. Although the returns from constructing a filature workshop were promising during

³⁷ China Maritime Customs, *Returns of Trade and Trade Reports, 1920*, pp. 863-864.

³⁸ Peng tonghu, *Sichuan jindai jingjishi*, p. 214.

³⁹ Lü Pingdeng, *Sichuan nongcun Jingji*, p. 96.

most of the Republican years, there was still the danger of heavy losses. One of the best performing filature, the Yushin Filature, for instance, lost 61,726 taels in 1920, which represented an over 100 percent loss of capital.⁴⁰

In contrast, the land investment was rather stable. The land rent is about 10 percent of the land price in Sichuan in 1926, according to the study of H. D. Brown and Li Min Liang.⁴¹ About 15 years later, another research made by the Farmer's Bank of China between 1940 and 1941 suggests that the receipt of landlord from land was still about 10 percent of land investment before deducting expenses, and 8.07 percent after deducting expenses. As the investigators in the 1940s noticed, although 8.07 percent was not high, "it is a good rate for a safe investment like land."⁴²

Hence, some would prefer to invest in land instead of establishing or upgrading a factory. When Chen Wanxi moved to Leshan, he left the Binong Filature, the earliest filature in Sichuan, to his brothers to run. In 1926, Chen's brother borrowed from him 200,000 dollars, a sum of money enough for a new filature, under the pretext of expanding their factory and business. In reality, the money was used to purchase land, and Chen's brother became large landlords in Santai.⁴³

⁴⁰ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 849.

⁴¹ H. D. Brown and Li Min Liang, "A Survey of 50 farms in the Chengdu Plain, Szechwan," p. 47.

⁴² J. Lossing Buck, *An Agriculture Survey of Szechwan Province, China* (Chongqing: The Farmer's Bank of China, 1943), p. 11. Reprinted in John Lossing Buck, *Three Essays on Chinese Farm Economy* (New York and London: Garland Publishing, Inc., 1980).

⁴³ Feng Deliang and Leshan shi zhengxie wenshizu, "Leshan huaxin sichang

To Mechanize or Not

There were both advantages and disadvantages to the mechanization of the silk reeling industry in modern Sichuan. On the one hand, inter-woven social and economic problems restricted the performance of steam filatures. The large population compelled rural households to produce cocoons at minimum levels of input and accept low wages. The low cost of raw materials and wages promised producers significant margins of profit. Steam filatures, however, required higher reel-worker ratios, higher wages, and more cocoons to produce the same amount of raw silk than non-mechanized workshops. The fixed capital and working capital of filatures were much heavier than those of the non-mechanized workshops, which meant substantial interest burdens on the filatures. In fact, filatures saved neither labor nor cost, but offered lower productivity per peel than the non-mechanized workshops. In addition, steam filatures were more risky than land investment, and generated less significant and slower returns than speculation in the financial market. These concerns suggest mechanization were not always a choice of local investors.

On the other hand, steam filatures did emerge and evolve, and the output of filature silk kept increasing in Republican Sichuan. Why did this take place? In her study on sericulture in the lower Yangzi, Lillian M. Li similarly noticed that the advantage of steam filature silk vis-à-vis non-filature silk was not that the former was labor or cost saving. She suggested that it was the standardized and consistent

xingshuaiji”, p. 37.

quality that filature silk offered that drove the demand for such silk in the international market, which in turn promised higher profits for investors.⁴⁴ I have argued that there were not remarkably higher profits for investors in Sichuan, at least in the mid-1920s. I agree with her explanation however that filature silk was more welcomed in the international market. The demand for high quality filature silk was increasing, and the price remained stable.

Filatures producing filature silk of good quality could easily take advantage of market opportunities. In 1923, the price of steam filature silk was raised by 400 taels per picul because of the earthquake in Japan.⁴⁵ Silk produced from the Binong Filature was sold at 1,600 taels per picul, which was a price that the non-filature silk could never achieve.⁴⁶ Silk of superior quality were sold at stable and high prices in the market. Even during 1924, when the bearish market for silk meant that low quality Sichuan filature silk “did not find a satisfactory market”, or fetched lower prices, the best Sichuan filature silk was still sold at 960 taels per picul, a price higher than that paid for the best filature silk from Shandong.⁴⁷

Furthermore, it is also necessary to point out that the steam filatures achieved economies of scale that financially weak workshops could not. While about 1,000 small frames produced 750 piculs of raw silk in Nanchong at a high productivity rate

⁴⁴ Lillian M. Li, *China's Silk Trade*, p. 24-30.

⁴⁵ China Maritime Customs, *Returns of Trade and Trade Reports, 1923*, p. 26.

⁴⁶ Sichuansheng difangzhi bianzhuanyuanhui, ed., *Sichuan shengzhi, renwuzhi*, p. 394.

⁴⁷ China Maritime Customs, *Returns of Trade and Trade Reports, 1924*, pp. 24-25.

of 0.75 piculs per frame, and 2,000 piculs of raw silk by 5,000 small frames in Santai at the rate 0.4 piculs per frame⁴⁸, the Huaxing Filature in Leshan could produce 300 piculs a year with 360 steam reels alone, and the Yushin Filatures, 400 piculs using the 356 reels.⁴⁹ It was true that the productivity per reel in filatures was generally lower than that in the non-mechanized workshops, and the profit of per picul of raw silk was almost the same in filatures and workshops. But the economies of scale made up for these disadvantages. Filatures were financially strong enough to remain in operation throughout the whole year, and their goods were easily sold out without worrying about the competition in the market.

There was a trend of gradual industrialization and continuing upgrading in Sichuan silk reeling business, although the pace was rather slow. The number of filatures and the total output of raw silk kept increasing from the 1900s to the 1920s. Factories investors were willing to embrace promising techniques, if they could afford the heavy cost and high risks.

Conclusion

From the beginning of the twentieth century to the early 1930s, the output of Sichuan raw silk, including both non-filature and filature silk, was stimulated by market demand and increased dramatically. The growth in the output of raw silk did not cover the fact that there existed a diverse range of technological levels in the

⁴⁸ Sanshigyō Dōgyō Kumiai Chūōkai, ed., *Shina sanshigyō taikan*, p. 772.

⁴⁹ Xu Xinwu, ed., *Zhongguo jindai saosi gongyeshi*, p. 253.

reeling industry. The silk industry was neither completely pre-modern, nor totally or highly mechanized; it employed techniques and technologies ranging between the most traditional ones that were utilized in the nineteenth century to the relatively advanced ones that even Shanghai filatures did not adopt.

There was an enthusiastic tide of technological development in the 1900s. Various institutes and individuals participated in improving the indigenous simple large frame reeling devices that produced coarse domestic silk. After most producers adopted the indigenously improved reeling devices and techniques such as the re-reeling of domestic silk and small frames, very few went further to establish steam filatures. Political instability prevented large investment in factories, but an economic analysis demonstrates that economic concerns were more significant in affecting the investors' choices. Non-mechanized filatures were cheap and could profit well under the prosperous market condition, but silk quality was inconsistent and its price fluctuated significantly. Steam filatures provided economy of scale advantages and high quality fine silk that could obtain high selling prices, but they were expensive and risky investments.

Complicated economic concerns influenced the individual investors' choices to pursue mechanization or otherwise. Nonetheless, the idea of mechanization did not appeal to the majority of the participants in the reeling industry in Sichuan. When business was promising and economic returns was probable, very few producers considered further technological progress. Behind the spectacle of the prosperity of

silk industry, there was a rationally-motivated lack of interest in technological progress in Sichuan during the 1910s and 1920s.

CHAPTER SEVEN

Economic Depression and Intensified Involvement of the Provincial Government,

1932 – 1938

The 1930s was the watershed decade for the technological development of Sichuan sericulture. The interaction of two major processes saw the government replace the local elites in the control of expertise. First, the government expelled the local elites from the leadership of technological diffusion. Second, modern technology succeeded in the competition against indigenous technology. The world-wide economic depression compelled local society to reflect, for the first time, the weaknesses of indigenous sericulture and to seek modern remedies. The central concern was to replace the “backward” indigenous technology with a foreign one based on scientific knowledge and mechanization, which required a powerful centralized authority to effect. The local elites were financially and intellectually incapable of fulfilling the task. The involvement of the government was unavoidable and actually welcomed by local society. At the same time, the Sichuan provincial government accumulated substantial power after two decades of civil wars. It directly intervened in sericulture through the promotion of modern technology. The progress of government-initiated technological diffusion, however, alienated the local elites and producers using indigenous technologies. After performing leading roles in sericulture technological diffusion for thirty years, local elites lost their voice to the provincial government and sericulturists from outside Sichuan.

Impact of the World Economic Depression

On 29 October 1929, the Wall Street stock market crashed and consequently triggered world-wide economic depression, although the waves of economic downturn did not impact China until 1932. China had adopted the silver standard system while all the Western countries and Japan were on the gold standard at the time of the depression. Silver was a commodity in the gold standard countries and therefore its price dropped alongside the other commodities in the economic depression. This in turn benefited exports and became a talisman for the Chinese economy. During the years of the falling price of silver from 1927 to 1931, all sectors of the Shanghai industry and commerce were prosperous.¹ Only from the late 1931 was the prosperity brought by the low price of silver reversed, after the sterling went off the gold standard in September 1931, subsequently the Japanese Yen in 1932, and the US dollars in 1933. The United States also passed the Silver Purchase Act in 1934, which enforced the purchase of silver by the Treasury. As a result, the international price of silver rose nearly three times from 1932 to 1935.²

When the protection offered by the silver standard monetary system disappeared, silver flowed out from China in great quantities and commodity prices declined significantly. Hence, China's foreign trade suffered severely. At the same

¹ Parks M. Coble, Jr., *The Shanghai Capitalists and the Nationalist government, 1927 – 1937*, (Cambridge and London: published by Council on East Asian Studies, Harvard University, Distributed by Harvard University Press, 1980).

² For a detailed examination on the silver price to economic depression in China, see Tomoko Shiroyama, *China during the Great Depression*, chapter 6.

time, the Japanese dumping policy increased the availability of Japanese raw silk in the international market. Japanese raw silk exports to Europe expanded over 3.4 times from 1931 to 1934, and nearly pushed Chinese silk out of the international market.³ As the largest export item of China, total raw silk export dropped from 284,000 piculs in 1931 to 147,000 in 1932, returning to its level in the 1880s, and its price was reduced by over half from 1931 to 1933.⁴

Similarly, the Sichuan silk industry was damaged by shrinking Western demand and dropping international prices. Sichuan raw silk lost nearly all of its Western market. The export of raw silk through the Chongqing and Wanxian customs declined from 13,051 piculs in 1931 to 9,103 piculs in 1932, 6,776 piculs in 1933, and even plummeted to as low as 2,910 piculs in 1935. Raw silk had been Sichuan's leading export commodity ever since the late nineteenth century. The value of export raw silk always accounted for over one fifth of total exports in Sichuan. It even reached 40.7 percent of total export value in 1926. However, the importance of raw silk in China's export trade was soon wiped off as a result of the Great Depression. Raw silk was only worth 2.3 percent of total export value in 1935.⁵

As they were produced for the Western market, filature silk and large amounts of re-reeled raw silk were the commodities most heavily impacted by the economic

³ Tomoko Shiroyama, *China during the Great Depression*, pp. 117-118.

⁴ Hsiao Liang-lin, *China's Foreign Trade Statistics, 1864 – 1949* (Cambridge: published by East Asian Research Center, Harvard University, Distributed by Harvard University Press, 1974), p. 110.

⁵ Jiang qingxiang and Li shouyao, eds. *Sichuan cansiye*, pp. 15-19.

decline. There were over 20 steam filatures in the whole province in the 1920s, but only 12 were still partially in operation in the early 1930s. The trade of re-reeled domestic silk, which was inferior to filature silk, declined even more in the foreign market. For instance, the report of the Chongqing customs shows that the majority of export silk in March 1934 was made up of filature silk and waste silk, without a trace of re-reeled domestic silk.⁶ Nanchong, as a large center of non-mechanized raw silk oriented towards the Western market, suffered a sudden decline. In 1930, there were 27 small frame workshops and factories equipped with 3,530 reels in both urban and rural Nanchong. There were also over 20 firms producing coarse domestic silk using large frames and non-re-reeling small frames. Of the total output of 4,000 piculs of raw silk in that year, 2,800 piculs went to the Western markets at a price of about 1,300 dollars. In 1932, silk prices plummeted to 380 dollars a picul. The number of reeling firms was reduced to 16 in 1932 and 10 in 1933.⁷ By 1934, nearly all reeling firms had been closed down, except one filature and two or three workshops that catered to the local weaving industry.⁸

In contrast to the rapid decline of the Western market, the tropical markets buffered the decline of Sichuan's raw silk exports to some extent, especially in southern Sichuan.⁹ While production in the largest raw silk producing area of Santai and its neighboring regions in northern Sichuan dropped from an annual average

⁶ *Sichuan yubao* 4, 4 (April 1934), p. 70.

⁷ Xie Cheng and Li Renjie, "Nanchong cansi kaikuang", p. 59.

⁸ *Sichuan yubao* 4, 6 (June 1934), p. 60.

⁹ Yin Liangying, *Sichuan canye gaijinshi*, p. 31.

output of 11,500 piculs between 1917 and 1931 to 6,000 piculs between 1932 and 1936, annual raw silk output in southern Sichuan dropped from 11,000 piculs to 8,000.¹⁰ When the export trade to the Western market was heavily reduced, export to Burma and India remained comparatively prosperous. For example, 4,306 piculs of Sichuan coarse silk were exported to Burma through Yunnan in 1934, and 6,390 piculs in 1935.¹¹ The majority was produced in southern Sichuan.

However, we should not exaggerate the role of the tropical market. It constituted only a small fraction of an annual output of over 40,000 piculs of raw silk in Sichuan before the 1930s. After all, the tropical business did not reverse the decline of sericulture in southern Sichuan, or even in its center, Leshan. Mulberry trees were cut down in the countryside and workshop workers were laid off. Except for the Huaxin Filature, which was included into the provincial government's reform plan, all the remaining reeling factories in Leshan were closed down in 1934. In nearby Jingyan, more than 2,000 workers became unemployed due to the collapse of silk reeling industry. Unemployment was more serious in the reeling industry than in other types of industry in this county.¹²

The economic depression also created serious repercussions on the domestic market for raw silk. The silk weaving industry in Sichuan consumed the largest

¹⁰ Jiang qingxiang and Li shouyao, eds. *Sichuan cansiyue*, pp. 49-51.

¹¹ Sichuansheng difangzhi bianzhuan weiyuanhui, ed., *Sichuan shengzhi, sichouzhi*, p. 264.

¹² Zhongyang dang'an'guan and Sichuansheng dang'an'guan, eds., *Sichuan geming lishi wenjian huiji*, 12. 1927 – 1934 (Historical documents on revolution in Sichuan, December 1927 – 1934), pp. 545, 547.

amount of silk produced in the province before the depression. Unfortunately, the weaving industry gave no support to sericulture during the depression. The number of looms in Chengdu, the largest weaving center of the province, was reduced to 1,000 from 8,000.¹³ It was estimated that the number of looms in Chengdu was reduced by two third from 1932 to 1933 alone.¹⁴ The weaving workshops produced about 100,000 bolts of silk pieces in Leshan in the mid-1920s, but only 20,000 to 30,000 bolts in the mid-1930s.¹⁵

The decreasing international demand for silk pieces did not directly destroy the silk industry in Sichuan. It was the plight of the domestic market that seriously damaged the weaving industry. It is notable that the finished silk pieces were primarily consumed within Sichuan and its neighboring provinces, rather than in the foreign market. The highest level of silk pieces export in modern Sichuan was merely 16,300 bolts, as recorded in 1908.¹⁶ The economic slump was a national phenomenon that affected both urban and agrarian economic conditions. The decrease in the value of agriculture caused the outflow of capital from rural area to cities. The increase in the price of silver led to the urban financial crisis.¹⁷ Subsequently, domestic purchasing power was restricted. This further contributed to the plights of sericulture in Sichuan.

¹³ You Shimin, ed., *Sichuan jindai maoyi shiliao* (Primary sources on trade in modern Sichuan) (Chengdu: Sichuan daxue chubanshe, 1990), p. 208.

¹⁴ *Sichuan yubao* 2, 3 (March 1933), p. 95.

¹⁵ Yin Liangying, *Sichuan canye gaijinshi*, p. 371.

¹⁶ Sichuansheng difangzhi bianzhan weiyuanhui, ed., *Sichuan shengzhi, sichouzhi*, p. 255.

¹⁷ Tomoko Shiroyama, *China during the Great Depression*, chapters 4 and 6.

The domino effect of the silk market's slump reached the rural economy, triggering the decline of the prices of cocoons, mulberry leaves, and silkworm egg cards. Cocoon prices dropped from 30-50 cents to as low as 12 cents per catty.¹⁸ Locally produced silkworm egg card fetched 50 to 60 cents during more prosperous periods, but only 3 to 5 cents during the depression.¹⁹ Peasants who were involved in sericulture were deprived of a market and an important source of cash income. Moreover, the unpromising sericulture situation exacerbated the plights of tenants and debtors. The land owners and money lenders decided that sericultural products could no longer be relied on to help tenants to pay off rental and debts and demanded more immediate repayment after the autumn harvest.²⁰ Unsurprisingly, sericulturist Yin Liangying attributed the collapse of the rural economy in Sichuan's sericulture regions to the failure of sericulture in the 1930s.²¹ Consequently, many farmers abandoned sericulture. For example, sericulture and weaving were the major supplementary occupations in the countryside of Changshou county near to Chongqing in the mid-1920s. Nevertheless, in the mid-1930s, "mulberry trees were cut down and sericulture tools were abandoned," and peasants turned to cultivate citrus.²² Similarly, in Deyang, many peasants who used to rely on the production of

¹⁸ You Shimin, ed., *Sichuan jindai maoyi shiliao*, p. 209.

¹⁹ Xiao Juefei, "Santai cansiye gaikuang", p. 12.

²⁰ Zhongyang dang'an'guan and Sichuansheng dang'an'guan, eds. *Sichuan geming lishi wenjian huiji*, p. 547.

²¹ For instance, Yin Liangying, *Sichuan canye gaijinshi*, p. 45.

²² Masao Kanda, *Shisen-shō sōran*, p. 407. Also see *Changshou xianzhi* (Changshou county gazetteer), 1944, vol. 4.

textile cut down mulberries and replanted other trees.²³

The Emergence of a Powerful Provincial Government

At the time the economic depression was wreaking its destruction, Sichuan was united under a single powerful warlord after a series of political transformations. In 1926, all major Sichuan warlords declared support for the Nationalist government and redesignated their troops as “Nationalist revolutionary armies”. The Nationalist government then assigned the Sichuan warlords to official posts. Nominally, Sichuan was under the jurisdiction of the Nationalist government, despite the fact that the Nationalist government made no tangible intervention in the military in-fighting within Sichuan until 1935. By the early 1930s, Liu Xiang and his uncle, Liu Wenhui, rose up as the most powerful rivals in Sichuan. Liu Wenhui commanded the twenty-fourth revolutionary army and held the position of provincial governor. Liu Xiang was the commander of the twenty-first revolutionary army and was appointed as Chief of Military Rehabilitation (*Sichuan shanhou duban*) by the Nationalist government. In 1932, the last civil war in Sichuan broke out between the two Lius, with the defeat of Liu Wenhui coming in July 1933. Liu Wenhui and his army retreated to the mountainous western region of Sichuan that was later called Xikang Province. In August 1933, Liu Xiang finally controlled the Sichuan Basin.

Political unity was crucial to the economic stability of Sichuan, as centralized

²³ *Minguo Deyang xianzhi* (Republican Deyang county gazetteer) (1939, reprint, Chengdu: Bashu shushe, 1992), vol. 2

economic policies at the provincial level were possible for the first time in twenty years. From 1933, Liu Xiang and his supporters started economic reform. Liu Xiang led the Office of Military Rehabilitation. His office established the Chongqing commodity inspection office in 1933, to be in charge of the inspection of bristle, hides, raw silk, and Chinese herbs exported from Chongqing.²⁴ It started stabilizing the Chinese currency from 1934 by uniting major local banks to establish the Local Bank of Sichuan. It also organized the native goods improvement committee, which had branches in some major commercial centers, such as Leshan. These economic reforms were not flawless. For instance, The Local Bank stabilized the economy at first, but soon caused inflation in mid-1934.²⁵ However, it shows that the provincial authority was capable of intervening in the province's economy at a broad level at that time.

The Sichuan provincial structure was reorganized by the Nationalist government in 1935. The new provincial government was formally established in Chongqing on 2 February 1935, and it abolished the garrison system. Jiang Jieshi introduced a special administrative inspectorate system into Sichuan, where the province was divided into eighteen inspectorates under the charge of Inspectors appointed by Jiang Jieshi.²⁶

²⁴ Xiang Yuzhang, ed., *Zhongguo churujing jianyan jianyi zhi* (Record of entry-exit inspection and quarantine of China) (Beijing: Zhongyang wenxian chubanshe, 2006), vol. 9, p. 5492.

²⁵ Bai Zhaoyu, "Fanlan yishi de sichuan defang yinhang duihuanquan" (A surfeit of exchange certificates of the Local Bank of Sichuan), *Sichuan wenshi ziliao xuanji* 39 (1991), pp. 62-79.

²⁶ Kapp, *Szechwan and the Chinese Republic*, p. 110.

Despite the Nationalist government's attempt to incorporate Sichuan into the national political structure, the leading positions in governing Sichuan were still tightly controlled by the local officials. The Nationalist government appointed Liu Xiang as the provincial governor, and his supporters occupied other critical positions in the Sichuan provincial government. Liu Hangchen for example became the provincial treasurer. Liu Hangchen was a Sichuan native, who graduated from the Department of Economics at the Peking University, and had been Liu Xiang's treasurer since 1927. Deng Hanxiang was appointed secretary general of the provincial government. An influential politician in Sichuan, Deng belonged to the inner circle of Liu Xiang regime. Later that year, Lu Zuofu, the most influential industrialist in Sichuan and owner of the Minsheng Company, was appointed Chief of the Department of Construction. Lu was eager to modernize industry and agriculture. This clique of local politicians was so powerful that the central Nationalist government continuously faced resistance in its attempt to control Sichuan, even after the powerful military leader Liu Xiang passed away in 1938.²⁷ Undoubtedly, the powerful local leadership was politically capable of leading economic reforms. The backgrounds of these political leaders suggest that they were interested in initiating such reforms in a province torn by frequent wars and economic depression.

Proposal on Modern Technologies

The economic depression stimulated people in Sichuan to examine the

²⁷ Ibid., chapter 7.

shortcomings of sericulture for the first time in Republican Sichuan. The filature owners were the first ones to react when the repercussions of the depression were just becoming manifest. They considered inefficient management and managerial practices as the root of the problem. The solution was to organize their factories into a silk cartel. In 1931, several filatures in Chongqing were organized into the Jiuhe Company. The Jiuhe Company conducted the collective purchase of raw materials and trade of raw silk, through which it hoped to reduce production costs sufficiently to achieve a competitive price for raw silk in the Shanghai market.²⁸ However, the cartel offered only a temporary boost for the industrial production of raw silk without addressing the fundamental problems of sericulture. It was not possible to reduce the cost of raw silk without resolving all of the interwoven institutional, agricultural, industrial, and financial problems. Moreover, because of the continuing deterioration of the international and Chinese economies, the attempt failed within one year.

Following the accelerated decline of sericulture, the intrinsic technical shortcomings of sericulture techniques and technologies gradually attracted more attention. For example, the Linshui government argued that the quality of silkworm eggs was crucial to the quality of silk, and in 1932, distributed to farmers free silkworm egg cards produced by its bureau of construction.²⁹ Subsequently, the

²⁸ You Shimin, ed., *Sichuan jindai maoyi shiliao*, p. 209. It claims the company was organized by nine filatures and called “jiuhe” (United nine). Sichuansheng difangzhi bianzhan weiyuanhui, ed., *Sichuan shengzhi, sichouzhi* suggests the company was participated by seven filatures and called “jiuhe” (Long united), see pp. 270-271.

²⁹ *Chuan bao*, 3 April 1932.

native goods improvement committee of Leshan held a meeting in 1934 to discuss the improvement of the silk industry. Concentrating on technological improvement in silkworm rearing, silk reeling, and silk weaving, the meeting especially noted the importance and urgency of introducing “science” into sericulture.³⁰

The most thorough review of Sichuan sericulture was made by a foreign expert commissioned by the provincial government. In 1933, the Sichuan provincial government appealed to the National Economic Commission to investigate the problems of Sichuan sericulture. The latter sent a foreign expert to examine the state of sericulture in Chongqing, Leshan, Santai, and Mianyang in late 1933. According to the survey, the natural climate of Sichuan was advantageous to sericulture, but the sericulture technologies utilized were backward. It was dry in spring and mulberry leaves contained less moisture, which was suitable for silkworms. The land was fertile and the large population was industrious. However, the water used for reeling silk had high mineral content, which caused the silk to lose its luster. Both the indigenous devices and mechanized reeling machines used in Sichuan sericulture were obsolete. The workers lacked professional technical training and the management of the filatures was inefficient. Cocoons were not carefully selected before reeling. It took a long time to raise a crop of silkworms, and peasants did not protect silkworms properly, which increased the risks of silkworm diseases.³¹

³⁰ “Leshan tugai weiyuanhui zhaokai cansi sizhi liang zhuanhui” (Leshan native goods improvement committee held two special meetings on sericulture and silk weaving), *Sichuan shanhou duban gongshu tuchan gaijin jihua* 1, 5 (1934), pp. 194-195.

³¹ *Sichuan yubao* 5, 2 (July 1934), pp. 41-50.

The expert proposed solutions that were based on foreign knowledge and techniques. Hi suggested sending technicians and managers into Shanghai filatures to learn foreign production and managerial techniques, inviting the graduates and teachers from the leading modern sericulture school, the Jiangsu Provincial Girls' Sericulture School, to provide training for workers, grading cocoons according to standardized criteria, reducing the speed of reels and upgrading the machines, conducting chemical tests of the water used for water, and teaching silkworm raisers modern skills.³²

In addition to the government initiative, the private sector also explored the problems and solutions of sericulture. In 1933, Li Kui'an and Huang Mianzhan, representing the Chongqing Silk Guild, proposed a plan for the recovery of the Sichuan silk industry. They summarized the factors that led to the failure of Sichuan silk – Sichuan silk producers did not keep up with the development and the needs of the international market; factories were not well organized, financed, and equipped; experts and professionals were lacking in dealing with the problems in factories. Furthermore, the raw materials were of low quality and the machines were outdated. Modern management methods in the factories or direct connections with foreign purchasers were non-existent. Local producers competed among one another and local industry did not receive government support. To resolve these problems, they suggested studying advanced factories, sending promising students overseas to study, subscribing to and studying foreign sericulture journals, updating existing equipment,

³² Ibid.

setting up sericulture schools and research institutes, raising abundant capital, establishing cooperatives related to all stages of the sericulture industry, from production to sale.³³ In 1936, an article titled “Personal view on reviving Sichuan sericulture” was published in the journal *Sichuan Peasants*. It similarly underscored that sericulture should be improved through training professionals, improving silkworm and mulberry varieties through scientific testing, introducing modern cocoon drying techniques and reeling machines, and organizing cocoon purchasing institutions and a centralized silk marketing system.³⁴

These views on Sichuan sericulture all emphasized the overall improvement of existing technologies. The economic crisis had exposed all the weaknesses of the existing technologies, regardless of whether they were indigenously originated or foreign imported. The proposers called for systematic reform encompassing all stages of sericultural production, from the mulberries seeds to the silkworm eggs, from the leaves for feeding silkworms to the water for boiling cocoons, and from the silkworm rearing rooms to the silk reeling factories. Most importantly, rather than simply encouraging increased output, these appeals highlighted that the reforms should be tied with mechanized technologies and knowledge from laboratory experiments and measurable empirical data.

In fact, the improvements sought were far beyond the capability of private

³³ Li Kui’an and Huang Mianzhan, “Jiuji sichuan siye zhi yijian” (Suggestion on recovering silk industry in Sichuan) *Gongshang tekan* 1(1933), pp. 22-53.

³⁴ Zhang Zhenhua, “Fuxing Sichuan cansiye zhi wojian” (Personal opinion on recovering sericulture in Sichuan), *Shunong* (September 1936), pp. 12-15.

individuals. Local non-official and semi-official elites were, despite their ardor, too powerless to carry out large scale technological improvement. Most of them had no financial strength to finance the most advanced filatures and to keep developing them. They were incapable of influencing large scale reform in the countryside either. Furthermore, the economic plight in the early 1930s had heavily weakened their financial might. They were not able to carry out vertically integrated technological reform that combined agrarian modernization and urban industrialization. Their strategy of grafting improved technology onto existing local conditions was unable to resolve the inherent problems of sericulture. Li Kui'an and Huang Mianzhan pointed out clearly that the private sector had exhausted its financial ability. They appealed resolutely to the government to support and sponsor reforms to increase productivity and improve the quality of raw silk.³⁵ Similarly, an article in the *Commercial Daily* in Chongqing argues that the provincial government should be primarily responsible for the recovery of sericulture.³⁶

Provincial Government Intervention in Industrial Production

The economic depression transformed the structure of the silk reeling industry, and allowed the provincial government to increase its influence in it. The filature owners and silk dealers welcomed the government intervention in the beginning, but soon found them powerless and hapless after the government's unexpected takeover.

³⁵ Li Kui'an and Huang Mianzhan, "Jiuji sichuan siye zhi yijian", pp. 44-45.

³⁶ *Chongqing shangwu ribao* (Chongqing commercial daily), 5 September 1933.

Ever since the depression began, the silk producers had eagerly requested relief from the provincial authority and the Nationalist government. The Chongqing Silk Guild dispatched representatives to Nanjing to appeal to the Ministry of Finance to issue silk bonds, while the Chongqing Chamber of Commerce requested relief funds from the Ministry of Industry, like what was done in Jiangsu and Zhejiang. Santai silk merchants also sent a report on the silk industry to the Ministry of Industry to seek assistance. In response, the central Nationalist government exempted Sichuan raw silk from export duties, but delegated further relief issues to the provincial government. The latter only provided a meager amount of 20,000 dollars for the industry, and instructed the military garrisons to reduce or remove transit taxes and other levies on silk; these instructions were hardly obeyed by all local military authorities.³⁷

The provincial Committee for the Rehabilitation of Sichuan Silk (*Chuansi zhengli weiyuanhui*) was organized in January 1933. The committee was composed of government members, bankers, and silk industrialists. It maintained three sections that took charge of rural sericulture, industrial production, and marketing respectively. Liu Xiang's followers controlled the committee in reality. The head of the committee, Gao Xianjian was Liu Xiang's expert advisor. Liu Hangchen controlled the section of industrial production. The general manager of the Dahua Raw Silk Company that was formed by the committee was Ning Zhicun, a supporter of Liu

³⁷ *Sichuan yubao*, 1, 2 (August 1932), pp. 15-17; 1, 3 (September 1932), p. 27; and 1, 6 (December 1932), p. 26.

Hangchen.³⁸ The local banking industry was another active participant in the committee, unsurprising since the silk industry was closely tied with the local banks. Local banks lent money to silk dealers and producers with high interest and expected to receive hefty profits. The collapse of factories and excessive supplies of raw silk created the financial crisis. The banks were unable to withdraw the previous loans to the silk producers, and the latter could not receive further financial aid from the former. The banking industry therefore favored the plan of merging silk reeling factories so that both could survive the economic depression.³⁹

According to the committee's plan, eleven steam filatures in Sichuan were combined to form the Dahua Raw Silk Company. The Dahua represented nearly the total capacity of filature silk production in Sichuan at the time.⁴⁰ In January 1933, only 12 filatures remained under operation in March that year, when the Dahua was established. The Dahua owned assets totaling more than 1,650,000 dollars and 4036 reels, over 64 percent of the steam reels in the province. Of the other 36 percent of reels in Sichuan, only 256 were still running that year. The capital of the Dahua came from three sources – the investment of individual filatures, the company-issued bonds, and the loan provided by the banking industry. The latter two were secured by the Committee for the Rehabilitation of Sichuan Silk.

The Committee conducted an integrated reform of sericultural production and

³⁸ You Shimin, ed., *Sichuan jindai maoyi shiliao*, p. 210.

³⁹ Xu Xinwu, ed., *Zhongguo jindai saosi gongyeshi*, p. 353.

⁴⁰ *Ibid.*, p. 354.

industrial managerial technology in the Dahua Raw Silk Company. It introduced to the peasantry the improved white silkworm variety, improved the quality of mechanized produced raw silk, and traded directly with foreign export companies.⁴¹ In the spring of 1933, the Dahua accumulated the capital to purchase over 40,000 piculs of fresh cocoons. These cocoons were distributed to the eleven filatures to produce, with a commission of 240 dollars per picul.⁴² Despite these efforts, costs were still higher than the international price of raw silk. The silk price was as low as about 300 dollars a picul in the Shanghai market in 1934.⁴³ The Dahua stopped business in 1935 with a deficit of 1,200,000 dollars.⁴⁴

Despite the failure of the Dahua, the Sichuan government did not give up controlling silk production. The Department of Construction charged by Lu Zuofu at the time announced five guiding principles for the reform of filature silk industry in Sichuan. The central point was to integrate all existing filatures under tight government control. The provincial government would appraise the filatures and take over the filatures or assets that matched the criteria to set up a silk corporation, so that raw silk could be rationally produced in Sichuan, based on the level of demand in the Shanghai markets and the availability of cocoons locally.⁴⁵ The debt obligations of the eleven filatures of the Dahua constituted one reason why the

⁴¹ You Shimin, ed., *Sichuan jindai maoyi shiliao*, p. 210.

⁴² Xu Xinwu, ed., *Zhongguo jindai saosi gongyeshi*, p. 355.

⁴³ You Shimin, ed., *Sichuan jindai maoyi shiliao*, p. 210; Masao Kanda, *Shisen-shō sōran*, p. 507.

⁴⁴ Sichuansheng difangzhi bianzhan weiyuanhui, ed., *Sichuan shengzhi, sichouzhi*, p. 127. Masao Kanda, *Shisen-shō sōran*, p. 507.

⁴⁵ *Sichuan yubao*, 8, 3 (March 1936), p. 97.

government could so boldly take over the filatures. After the Dahua was closed down, the Committee for the Rehabilitation of Sichuan Silk issued company bonds to repay the loan of 450,500 dollars from the banking industry, which increased the government's share in the steam filatures.⁴⁶

The owners of the eleven filatures rejected the proposal. They acknowledged the debts and agreed to turn over their properties, but were reluctant to allow their enterprises to be taken over by the government without any compensation. They asked the government to purchase the filatures and assets. The other four filatures that did not join in the Dahua refused to join the government-private joint enterprise since they had not been a part of the Dahua and was not indebted to the provincial government.⁴⁷

Lu Zuofu, however, argued that centralized control and reorganization of the industry was the only plausible solution, since financial subsidy from the government for the private companies had been proven inadequate in resolving the problems.⁴⁸ Hence, the government threatened not to issue business licenses to the filatures, and announced that the government would take over the filatures belonging to the Dahua. It also decreed that the filatures should not resume operations until they met the strict criteria it formulated.⁴⁹ In the contest between the provincial government

⁴⁶ Xu Xinwu, ed., *Zhongguo jindai saosi gongyeshi*, p. 355, Sichuansheng difangzhi bianzhan weiyuanhui, ed., *Sichuan shengzhi, sichouzhishi*, p. 127.

⁴⁷ *Sichuan yubao*, 8, 3 (March 1936), p. 98.

⁴⁸ Ibid.

⁴⁹ Zhang Xuejun and Zhang Lihong, eds., *Sichuan jindai gongyeshi* (Industrial history of modern Sichuan) (Chengdu: Sichuan renmin chubanshe, 1990), p. 329.

and the local entrepreneurs, the former certainly gained the upper hand because of its political power.

Subsequently, the provincial government ordered to set up the Raw Silk Trading Company based on the property of the Dahua in 1936. The government provided 200,000 dollars to the company as a “relief” fee. Of these, 120,000 dollars was set aside to maintain filature production, but this objective was never realized. 20,000 dollars was for improving silkworm varieties, and 60,000 formed the government’s investment on the stock of the company. At the same time, the company raised private shares of 60,000 dollars.⁵⁰ The company yielded a considerable net profit of 83,403.82 dollars in 1936.⁵¹ Nevertheless, the tension between the filature owners and the government was not relieved.

The provincial government further reorganized the Raw Silk Trading Company as the Sichuan Silk Corporation (*Sichuan siye gongsi*) in 1937. He Beiheng became the new chief of the Department of Construction in 1937. He gave some concessions to the silk merchants and formed an agreement with them. The Raw Silk Trading Company, the filature owners, and share-holders became the co-owners of the Sichuan Silk Corporation, the largest silk company in Sichuan in the Republic. He Beiheng himself became the chairman of the board. Silk merchants assumed most of the positions in the board and management. However, the property of the

⁵⁰ Ibid., p. 328.

⁵¹ Sichuansheng difangzhi bianzhuanyuanhui, ed., *Sichuan shengzhi, sichouzhi*, p. 127.

participating filatures was measured after deducting the debts they owed while part of the Dahua, which means the filature owners' shares in the new company, and consequently their influence, shrunk. In reality, the Sichuan Silk Corporation was handled by the provincial government. According to Wen Shaohe, the leader of the silk merchants in Chongqing during the Republican era, the provincial government held 70 percent of the company's stocks in 1937.⁵²

After gaining control over the major steam filatures, the provincial government introduced a series of restrictions on the non-mechanized reeling factories. The Sichuan Silk Corporation had the right to monopolize all improved cocoons, and controlled the production of steam filature silk, according to the sixth section of the "Sichuan Provincial Government's Management Guidelines on the Silk Industry" (*Sichuansheng zhengfu guanli cansiye banfa dagang*) in 1937.⁵³ Non-filature factories were not allowed to purchase improved cocoons, nor be upgraded to steam filatures without joining the Sichuan Silk Corporation.⁵⁴ In other words, the provincial government prohibited all private ownership of industrialized silk reeling.

Through the Sichuan Silk Corporation, the provincial government realized

⁵² You Shimin, ed., *Sichuan jindai maoyi shiliao*, pp. 212-213; Wen Shaohe, "Huigu Chongqing shengsi shuchuye" (Recollect the export of raw silk in Chongqing), *Sichuan Wenshi jiliao jicui* vol.3 (Chengdu: Sichuan renmin chubanshe, 1996), pp. 424-425; *Sichuan yubao* 10, 6 (July 1937), p. 116. Wen Shaohe was the chairman of the board of the Chongqing Silk Guild when it was organized in 1924. He was the leader of both the silk merchants and the Chamber of Commerce in Chongqing for three decades. Many works on the Sichuan modern silk industry are based on his memory.

⁵³ Wang Zhuangmu, *Minguo sichou shi: 1912 – 1949*, p. 298.

⁵⁴ You Shimin, ed., *Sichuan jindai maoyi shiliao*, p. 211.

centralized management and tight control over filature silk production, which facilitated official diffusion of sericulture technology. The company widely employed sericulture experts who were trained in top Chinese modern sericulture schools or overseas, especially after a lot of experts migrated into Sichuan following the outbreak of the Second Sino-Japanese War. It carried out technological education to train skilled workers and technical personnel.⁵⁵ It began to introduce advanced multi-ends reeling machines that could produce raw silk of consistently high quality and productivity. By the end of the Republic, the number of multi-ends reeling machines accounted for one eighth of the total mechanized reels. Nearly all multi-ends reeling machines belonged to the Sichuan Silk Corporation. It also invested in cocoon drying machines, and invented the dual cocoon drying technique that could produce high quality dry cocoons.⁵⁶

Nevertheless, government intervention actually demonstrates governmental monopoly over the technology of industrial raw silk production and the decline of local elites' control of knowledge. It is notable that above-mentioned innovations and technological diffusions were conducted and limited within the Sichuan Silk Corporation. From the Dahua Raw Silk Company to the Raw Silk Trading Company, to the final formation of the Sichuan Silk Corporation, the provincial government accelerated its influence vis-à-vis the declining autonomy of filature owners. In

⁵⁵ Zhou Hairuo, Wu Menghui, and Fan Dizhen, "Fan Chongshi yu Sichuan cansang shiye" (Fan Chongshi and sericulture in Sichuan), *Sichuan wenshi ziliao xuanji* 41 (1993), p. 54.

⁵⁶ Sichuansheng difangzhi bianzhuang weiyuanhui, ed., *Sichuan shengzhi, sichouzhishi*, pp. 135, 117.

addition to the ban on establishing private filatures, the private sector was prevented from controlling and utilizing expert knowledge. The civil society that had collaborated with the government and been the leading force in knowledge diffusion for thirty years was now powerless in confronting the government. Excluded from the leadership and severed from access to the new technology, both steam filature owners, and non-steam filature owners became the victims of government intervention. The government's monopoly on the industrial production of raw silk was ultimately detrimental to the diffusion of reeling technology.

Provincial Government Intervention in Rural Sericulture

The decline of the raw silk market reminded local society of the issue of reforming the agrarian stage of sericulture. It was eventually decided that the growth of economic efficiency in raw silk production required solutions beyond the improvement of mechanized machines and the reorganization of filatures. The performance of mechanized reeling machines was deemed to be connected to the quality of cocoons. While controlling filature production, the provincial government also intervened through sericulture reform in the countryside. Similar to what had happened in the industrial sector, the agrarian sector demonstrated the diminishing influence of local elites.

Rural sericulture reform began from the introduction of new varieties of silkworms. From the beginning, the reform was carried out by official reformers from outside of Sichuan. The new silkworm varieties were produced through laboratory

tests and scientific breeding. These varieties were crossbred for high disease resistance and silk productivity. Sericulturists examined eggs under microscopes to check if they were disease contaminated before distributing them to the silkworm raisers. These new varieties called improved silkworms (*gailiangzhong*), to distinguish them from the domestically bred varieties that were generally called native silkworms (*tuzhong*). Before the 1930s, there were no improved silkworm varieties in Sichuan, but in the lower Yangzi, improved varieties had been bred and spread for a few years. The International Committee for the Improvement of Sericulture was the leading improved silkworm supplier in China in the 1930s.⁵⁷ Established in Shanghai in 1917 by the cooperation between the French, British, and American merchants, and the Jiangsu-Zhejiang-Anhui Silk and Cocoon Guild, it gradually set up quite a few breeding stations in Jiangsu and Zhejiang in the following years.⁵⁸ Through the International Committee for the Improvement of Sericulture, the Committee of Rehabilitation of Sichuan Silk purchased over 4,000 silkworm cards of improved variety in 1934. This was the first time that improved silkworm varieties were introduced into Sichuan. These cards were distributed to peasants of several counties including Jiangbei, Baxian, Nanchong, Leshan, Yanting, Santai, and Mianyang. At the same time, the National Economic Council dispatched sericulture experts into Sichuan to supervise peasants in raising the improved varieties. Three instruction stations (*zhidaosuo*) were set up in Baxian, Santai, and Mianyang. They were the first

⁵⁷ Shanghai sichouzhì bianzhuān weiyuanhui, ed., *Shanghai sichouzhì* (Record of silk industry in Shanghai) (Shanghai: Shanghai shehui kexueyuan chubanshe, 1998), p. 346.

⁵⁸ D. K. Lieu, *The Silk Industry of China*, pp. xv-xvi.

modern sericulture technological diffusion stations in Sichuan. The trial of improved silkworms was successful in producing a healthy high yield crop of cocoons that year. The market price of improved cocoons was about 50 percent higher than that of native cocoons.⁵⁹

In 1936, the provincial government set up the provincial Sericulture Reform Base (*Cansi gailiangchang*) to facilitate the experimentation and spread of modern sericulture technology. The Sericulture Reform Base was located in Nanchong, and set up offices in major sericulture producing regions. Despite the frequent changes of its name, its supervising offices and the organizations under its charge, the Reform Base specialized in sericulture laboratory research, mulberry sapling cultivation, silkworm egg breeding, and the promotion of sericulture technology. The establishment of the reform base made possible the diffusion of modern sericulture in the Sichuan countryside.

Due to the underdeveloped conditions of modern sericulture in Sichuan, the Sericulture Reform Base sought help from the Nationalist government in Nanjing, which had resources in terms of professionals and expertise. Sichuan at the time was no longer separated from the national government. This political integration facilitated Sichuan's application for technological help. In 1937, the Sichuan provincial sericulture reform base signed a contract with the National Agricultural Research Bureau in Nanjing. The research bureau was given the rights to supervise

⁵⁹ *Sichuan yubao*, 5, 1 (July 1934), pp. 82-83.

and examine the reform base's research plans, and to dispatch personnel to provide advice in Sichuan. In return, the provincial sericulture reform base could have their personnel trained and their research findings tested in Nanjing.⁶⁰

Yin Liangying presided over the Reform Base from 1936 to 1945. Yin was born in Anhui in 1913. He studied in the department of sericulture in the Fifth Provincial Agricultural School of Anhui, then subsequently studied in and received the degree of Bachelor in Agriculture from the National Central University in Nanjing. After graduation, he worked as a teaching assistant in the National Central University, and then became a technician in the Ministry of Industry's Bureau for the Inspection and Testing of Commercial Commodities, in charge of the inspection of imported silkworm eggs, at the same time supervising the breeding stations in Nanjing. Later he was appointed as the Head of the department of sericulture in the Huaiyin Provincial Advanced Agricultural School in Jiangsu. Between 1932 and 1935, he received a Nationalist government scholarship to study in the Tokyo Imperial University.

Nearly all sericulture professionals in the Reform Base were strangers to Sichuan, or received sericulture education outside of Sichuan. They possessed the latest sericulture knowledge. From the onset of the Reform Base's establishment, they took charge of the introduction and implementation of modern reform. Yin Liangying was representative of these external professional change agents in Sichuan in the 1930s

⁶⁰ *Zhongyang ribao*, 17 May, 1937.

and 1940s. Even Xiong Jiguang, a Sichuan native, had little involvement in sericulture in Sichuan before he joined the Reform Base. Xiong had received sericulture education in Nanjing and Japan. Before he became the technician of the Reform Base in Nanchong, he spent his whole career as a sericulturist in the lower Yangzi.⁶¹ In fact, the large number of external sericulture experts faced serious language barriers and terminological problems at the beginning of the reform effort.⁶²

Another significant characteristic of these reformers was they belonged to the generation strongly influenced by the cultural transformations ignited by the May Fourth Movement. The May Fourth intelligentsia placed great emphasis on science. Intellectuals as Hu Shi, Cheng Duxiu, and Wu Zhihui attacked the traditional Chinese order by calling for a scientific revolution. They infected a generation of students with the commitment to create a new civilized society of civilization, based on foreign science, by rejecting Chinese tradition.⁶³ Influenced by the New Thought tide of the May Fourth Movement, a generation of sericulture reformers distinguished them from the previous sericulture reformers in Sichuan such as Zhang Senkai, Chen Wanxi, and Zhang Lan. The previous generation of sericulture promoting elites, such as Chen Wanxi, integrated Confucian moral teaching and sericulture deity worship with sericulture. This new generation, in contrast, completely abandoned the

⁶¹ Zhongguo kexue jishu xiehui, ed., *Zhongguo kexue jishu zhuanjia zhuanlue: nongxue bian, yangzhi juan* (Biographies of Chinese experts in science and technology, cultivation in agriculture), vol. 2 (Beijing: Zhongguo nongye chubanshe, 1999), pp. 29-35.

⁶² Yin Liangying, *Sichuan canye gaijinshi*, p. 50.

⁶³ D. W. Kwok, *Scientism in Chinese Thought, 1900-1950* (New Haven: Yale University Press, 1965), chapters 2 and 3.

sericulture gods. Female sericulturist Fei Dasheng, who I will discuss with more details in the next chapter, belonged to this new group. She once commented on the achievements of sericultural reform in rural Sichuan in 1939, “In the past, peasants went to temples, burnt incense, and prayed to the gods, now they know that they need to trust knowledge and science.”⁶⁴

The Sericulture Reform Base was both a research institute for technological innovation and an agency for technological diffusion. For Yin Liangying, the reform base was an endeavor to realize the goals of “from countryside to research laboratory” and “promoting knowledge through practice.”⁶⁵ The reform base carried out research on the local silkworm and mulberry varieties, as well as tested and improved indigenous practices of silkworm rearing. These research accumulated Chinese sericulture knowledge and also helped to adapt non-native varieties and technologies to local conditions.

Other than laboratory research, the Sericulture Reform Base made more significant achievements in spreading modern sericulture technology. It specially focused on silkworm egg production and distribution ever since it was established. Improved silkworm eggs were the foundation of the improved quality and output of raw silk. However, the inland location of Sichuan did not favor the ideal of shipping silkworm eggs from the breeding stations in the coastal China. Long-distance transportation was costly and could damage the silkworm eggs. The high silkworm

⁶⁴ *Zhongyang ribao* (Central daily news), 18 December 1939.

⁶⁵ Yin Liangying, *Sichuan canye gaijinshi*, p. 1.

egg demand in Sichuan also far exceeded the production capability of coastal breeding stations. In 1936, the Reform Base produced silkworm eggs from the original breeds that were sent from the lower Yangzi. In 1937, it started breeding original breeds to enable the self-sustainability and development of modern sericulture in Sichuan. In the same year, the Reform Base succeeded in producing an autumn crop of silkworm eggs. It made possible the large-scale diffusion of the techniques of producing two crops of silkworms annually in Sichuan. Thus, the silkworm egg production capability of the reform base increased significantly. By the late 1937, the reform base had supervised six breeding stations and produced 279,916 improved silkworm egg cards in total.⁶⁶ From 1938, the Sichuan Silk Corporation handled improved egg production and distribution. It distributed 480,000 cards in 1938, 620,000 cards in 1939. The highest output and distribution of the Sichuan Silk Corporation was in 1940 when it produced 710,000 cards. Due to the economic difficulty and declined financial support from the provincial government, the output of improved silkworm cards was reduced from 1941, but still accounting for over 300,000 cards annually.⁶⁷

At the same time, the Sericulture Reform Base cultivated and distributed mulberry saplings of fine varieties. Mulberry trees were widely destroyed during the economic depression. The recovery of sericulture required the abundant supply of mulberry leaves. The availability of fine mulberry leaves could reduce the production

⁶⁶ Ibid., pp. 165-176.

⁶⁷ Jiang qingxiang and Li shouyao, eds. *Sichuan cansiye*, pp. 78-79; 80-83.

costs of cocoons significantly. The first mulberry nursery was set up in Nanchong in 1936, with only 5,530 saplings in that year. The number increased significantly and peaked in 1940, when the nurseries in ten counties, taking up a total of 2616.17 mu of land, grew a total amount of 43,710,635 mulberry saplings.⁶⁸

The Reform Base's department for the encouragement of sericulture handled the task of spreading modern sericultural knowledge and skill to the rural communities. It set up instruction stations as promotional branches in the major sericulture counties. In 1936, it controlled ten instruction stations in Nanchong, Xichong, Langzhong, and Santai.⁶⁹ The department developed quickly and it was reorganized as the sericulture encouragement committee in 1938, under the supervision of the Bureau of Sichuan Agricultural Reform. Its capacity was increased to 84 instruction stations and 325 staff in 1940. The scale of the encouragement committee was reduced after 1941, and it was taken over by the Sichuan Silk Corporation in 1943.⁷⁰

These instruction stations were the close link between peasants and the Sericulture Reform Base. They administered the applications for silkworm egg cards, registered peasants who wanted technological supervision, and taught peasants mulberry cultivation from January to March. After distributing silkworm egg cards in

⁶⁸ Ibid., pp. 157-158; But Chen Ciyu counts there were 3,693.27 mu of nurseries by quoting the governmental documents. Despite the divergence, 1940 was still the best year of mulberry cultivation of the reform base.

⁶⁹ Chen Ciyu, *Jindai zhongguo de jixie saosi gongye*, p. 253.

⁷⁰ Jiang qingxiang and Li shouyao, eds. *Sichuan cansiye*, p. 63.

April, they organized collective hatching and rearing, and guided silkworm rearing and mounting. In June, they helped with the cocoon harvest. From July to September, they led rearing of autumn crops. They investigated the output of cocoons in October. November and December were for mulberry cultivation instruction and peasant training. Chen Ciyu estimated that 61 percent of silkworm raisers in northern Sichuan had accepted instruction.⁷¹

The provincial government adopted a direct method of technological transfer to develop productivity in rural sericulture. The provincial Sericulture Reform Base as a government institute had become both the source and the channel of sericulture technology diffusion since 1936. It was an innovator and introducer, from which modern sericulture knowledge, practice, and products were propagated. It was also a channel in itself. Through its integrated organizations, the knowledge, practice, and products were distributed to the rural silkworm raisers.

Collectively, the provincial government and their employees replaced the local elites in technological diffusion in rural sericulture. The provincial government stopped being as aloof from agrarian reform as it had been in the 1910s and 1920s, but actively promoted modern technology in the countryside. In addition, the staff of the Sericulture Reform Base became a new group of technological change agents. They were primarily outsiders to the province, and had received high education in modern schools and governmental salaries as governmental employees.

⁷¹ Chen Ciyu, *Jindai zhongguo de jixie saosi gongye*, pp. 252, 267.

Conclusion

Following the economic depression and the unification of the province, Sichuan sericulture technological diffusion started a new era. First, the period between 1931 and 1938 witnessed the rising leadership of the provincial government, and the diminishing influence of the local elites. The provincial government controlled filatures, which were traditionally the domain of local elites as innovators in sericulture technology. Through its economic policies, the government further abolished the role of non-filature producers as receivers of modern reeling technology. At the agrarian stage of sericulture, there was also a tendency of expelling local elites from technological diffusion. The provincial government depended on external sericulture experts to evaluate the situation, to design the reform plans, and to carry out the rural reform.

Second, this phase reveals a demarcation between indigenous and modern technologies in sericulture. The government's intervention in the filatures drew a clear line between the mechanized and non-mechanized production of raw silk. It considered that only mechanized manufacturing could increase economic efficiency. The non-mechanized workshops were incurably backward and should not receive any special treatment. The provincial Sericulture Reform Base, similarly, spread new varieties and technologies that were never introduced into rural Sichuan. Even though its staff, many of whom had received the latest sericulture education in Japan, agreed the native technologies were not completely bad, they believed that these

native means had to be tested and improved through scientific methodologies. The provincial government and its reformers reached a consensus that Sichuan should adopt a set of modern sericulture techniques, including the industrialization of reeling processes and the modernization of agrarian production.

Third, this phase of technological reform precipitated rapid deskilling and re-skilling of rural sericulture. Following the public emphasis on modern technologies, farmers gradually lost their skills in many stages of sericulture. In the production chain of cocoons, farmers only needed to handle a small fraction of skills now. Farmers did not have to know how to produce improved silkworm eggs and mulberry seedlings. They did not need to process fresh cocoons by themselves, because improved cocoons required specific treatment. To some extent, farmers were deskilled as a result of the government's intervention.

While the peasants were rapidly deskilled of their traditional knowledge, they were also infused with modern skills. The sericulture instruction stations and reformers actively distributed various skills related to the procedure of rearing silkworm and cultivating mulberries. Peasants learned to disinfect rearing equipment and rooms, to hatch silkworms under the appropriate temperature, to feed silkworms with suitable sizes and quantities of leaves, to trim and fertilize mulberries, and to harvest cocoons efficiently, etc.

The economic depression had stimulated government participation in Sichuan sericulture. The financial, institutional, and administrative ability of the provincial

government resolved some previous problems that previous technological diffusion encountered, such as the lack of professional expertise, knowledge, and skills. However, these centralized means of diffusion were not flawless. Rather, government intervention caused some new problems and even prohibited further development, which will be discussed in the next chapter.

CHAPTER EIGHT

The Chinese Communist Party, the Nationalist Government, and Reformist

Intellectuals, 1938 – 1945

The outbreak of the Second Sino-Japanese War eventually transformed Sichuan into the very core of Free China. In late 1937, the Nationalist government announced the shift of the capital from Nanjing to Chongqing. A great number of educational and research institutions, factories, and professionals were relocated to Sichuan from the more developed coastal regions. Technological transfer was more intensive in this phase than previous years, affecting every single production enterprise, including the silk industry. This chapter first examines how the wartime situation offered Sichuan an opportunity for sericulture technological development. I will pay particular attention to a sericulture reform project in the southern Sichuan sponsored by the Nationalist government between 1938 and 1945, the Leshan Sericulture Experimental Area (LSEA).

In the previous phases, sericulture technological improvement primarily served economic purposes. However, during the wartime era, it became interwoven with national politics to an unprecedented degree. At the time, there was a national consensus towards production for the sake of the anti-Japanese war. The major leaders, namely the Nationalist government, the CCP, and reformist intellectuals, however, embraced different strategies towards sericulture reform. They cooperated

with one another, but also clashed over ideas and practices most of the time. Their divergent activities received different responses from the affected producers, particularly the rural silkworm raisers.

The sericulture reform of the LSEA, in fact, represented an economic United Front among three groups of distinct political identities. Research on the wartime relationship between the CCP and the Nationalist government concentrates mostly on their political and military cooperation and confrontation.¹ Earlier scholarship has also contributed to the understanding of the economic activities organized by these individual political groups.² However, little research has been done on their economic cooperation in promoting production in the countryside in the Nationalist-held areas during the war, in spite of the importance of the economy to the war.

This chapter therefore studies how different ideas and practices interacted within sericulture reform in wartime Sichuan, and argues their interaction shared the

¹ For instance, Shum Kui-Kwong, *The Chinese Communists' Road to Power: The Anti-Japanese National United Front, 1935 – 1945* (Hong Kong, Oxford, New York: Oxford University Press, 1988).

² For instance, for the Nationalist government economic activity, see Margherita Zanasi, *Saving the Nation, Economic Modernity in Republican China* (Chicago and London: The University of Chicago Press, 2006). For the CCP's, see Patricia Stranahan Jackal, "Changes in Policy for Yan'an Women, 1935-1947", *Modern China* 7, 1 (January 1981), pp. 83-112. For the economic projects of the reformative intellectuals, see Guy S. Alitto, "Rural Reconstruction during the Nanking Decade: Confucian Collectivism in Shantung", *The China Quarterly* 66 (June 1976), pp. 213-246. Sigrid Schmalzer, "Breeding a Better China: Pigs, Practices, and Place in a Chinese County, 1929 – 1937", *Geographical Review* 92, 1 (January 2002), pp. 1-22; Pomeranz, *The Making of a Hinterland*, chapter 2. And Fei Hsiao-Tung, *Peasant Life in China*, chapter 12.

same pattern to that of the military United Front. As result of the conflicting ideas and practices, the effectiveness of sericulture reform was highly limited.

The Arrival of the Nationalist Government

After years of tension between Japan and China, full scale war broke out after the Marco Polo Bridge Incident in July 1937. Japanese military training maneuvers near to the Marco Polo Bridge on the outskirts of Beiping (Beijing) on the night of 7 July 1937 had led to an exchange of fire between the Chinese and Japanese armies in the early morning of the next day. Both the CCP and the Nationalist government adopted an unyielding attitude towards the incident. The CCP immediately responded to the incident by calling for nation-wide resistance on 8 July. Jiang Jieshi too made an announcement on 17 July, declaring that China would prepare for self-defense and fight to the end. Nevertheless, a large area of territory was soon occupied by Japanese troops. Beiping (Beijing) and Tianjin, the largest cities in North China fell in August. Then Shanghai, the economic center of China came under attack from 13 August. The Nationalist government issued the “Proclamation of Self-Defense” on 14 August. The battle of Shanghai lasted three months. During this stage, the Nationalist government officially acknowledged the legal status of the CCP and formally announced cooperation between the CCP and the Nationalist government on 23 September. This marked the beginning of the Second United Front. After the fall of Shanghai, Japanese troops moved towards Nanjing, the political center of China at the time, forcing the Nationalist government to move the capital

to Chongqing in November, 1937.

When Chongqing was elevated as the temporary national capital, Sichuan immediately became the core of national politics, economy, and culture. Following the retreat of the Nationalist government, a huge number of educational and research institutes, factories, technicians, professionals, and students eventually migrated into Sichuan. By the end of 1940, 448 factories were relocated into interior China, of which 254 were in Sichuan.³ Sichuan developed a complete industrial structure with ordnance, heavy, light, and chemical industries. Higher educational institutions, including national and private universities, independent colleges, technical schools, private independent colleges, were relocated into Sichuan. By the end of the war, there were 50 higher educational institutions in Sichuan, including many leading universities in China.⁴ These educational institutions represented the most advanced knowledge and technology China possessed at the time.

For the first time, large scale diffusion of modern technologies was possible for all types of productions in Sichuan. Before the war, Sichuan was less developed than the coastal regions. In the eyes of the “downriver” people from the lower Yangzi River, even Chongqing, the leading treaty port and most commercialized city of Sichuan, was backward and under-modernized.⁵ The arrival of the various political,

³ Morris L. Bian, *The Making of the State Enterprise System in Modern China: the Dynamics of Institutional Change* (Cambridge: Harvard University Press, 2005), p. 138.

⁴ *The Chinese Year Book, 1944 – 1945* (Nendeln, Liechtenstein: Kraus Reprint, 1968), pp. 1108-1114.

⁵ Lee Mclsaac, “The City as Nation, Creating a Wartime Capital in Chongqing”, in

economic, educational, and cultural organizations and institutes, together with the immigrants, brought modern knowledge and practices into Sichuan. Although the wartime circumstances created several serious obstacles to technological diffusion such as the shortage of funding and materials, it also precipitated urgent demands on the adoption of technology to increase the output and quality of products.

In comparison to the desolate prewar state of sericulture education, there was an emergence of sericulture educational institutions in wartime Sichuan. The Jiangsu Provincial Girls' Sericulture School was relocated to Leshan and renamed as the Jiangsu Provincial School of Sericulture (*Jiangsu shengli cansi zhuanke xuexiao*). This school was the leading sericulture school in China and had accomplished significant achievements in sericulture research and reform before the war. The National Sichuan University established the department of sericulture in 1938. The Sichuan provincial Sericulture Reform Base and the Nanchong government worked together to transform the Nanchong Vocational School into the Provincial Nanchong High School of Sericulture (*Sichuan shengli nanchong gaoji cansike zhiye xuexiao*) in 1939.⁶ The students of the Girls' School of the International Committee for the Improvement of Sericulture finished their education in the Nanchong High School of Sericulture during the war. In 1939, the National Central School of Technology (*Guoli zhongyang jiyi zhuanke xuexiao*) was established in Leshan, with a department of

Remaking the Chinese City, Modernity and National Identity, 1900 – 1950, ed., Joseph W. Esherick (Honolulu, University of Hawai'i Press, 1995), p. 179.

⁶ The Nanchong Vocational School was previously the Nanchong Middle School that Zhang Lan was involved in the 1920s.

sericulture. In addition, a large number of leading Chinese sericulturists, such as Wang Tianyu, Ge Jingzhong, Wang Ganzhi, Zhao Hongji, Sun Benzong, Jiang Tongqing, Zheng Pijiang, and Duan Youyun, immigrated into Sichuan. They worked in the schools, research institutions, and the silk industry.

The high commercial and military value of silk encouraged the demand for the improvement of sericulture technology. By 1938, the Japanese troops had occupied the major sericulture regions in China. Sichuan was the only large raw silk supplier that was completely controlled by the Chinese government. Despite the decline of exports amidst the economic depression, the potential value of raw silk as a commodity of exchange for foreign currency was again highlighted in the war. Light and valuable, raw silk was an ideal product for export even amidst the increased difficulty of wartime transportation. The Chinese government signed three barter trade contracts with the U.S.S.R between 1938 and 1939. Raw silk was one of the goods that China supplied to the U.S.S.R in exchange for loans and other forms assistance. During the war, the importance of raw silk was further underscored by its military use. It was the raw material used to manufacture parachutes and powder bags. In 1938, the state-owned parachute factory migrated from Changsha, Hunan, into Leshan, to rely on the established silk industry in the region.

Civil demands on silk goods expanded with the population increase. Many immigrants from the lower Yangzi had to substitute Sichuan silk goods for those produced in Suzhou, Huzhou, Hangzhou, and Nanjing, the famous silk centers

occupied by the enemies. In Leshan alone, the output of silk pieces increased from about 30,000 bolts in 1937 to 60,000 to 70,000 bolts in 1941, and even reached 100,000 bolts in 1942.⁷ Another report even suggests that a more reliable estimate of the output of silk in Leshan in 1942 was 150,000 bolts.⁸ Nevertheless, the highest recorded prewar output of silk pieces in Leshan was only around 100,000 bolts, as reported by the local silk guild.⁹ The outbreak of war actually reversed the decline of the silk weaving industry in Leshan.

Raw silk was of such importance in the wartime economy that the Sichuan Production Planning Commission formulated an ambitious plan, with technological improvement as its central focus. It calls for the improvement of the output and quality of raw silk between 1941 and 1943. It aimed to distribute 210,000,000 mulberry saplings and 6,200,000 improved silkworm egg cards, to train 7,000 sericulture experts, and to produce 78,250 piculs of raw silk of high quality by gradually increasing the availability of reeling equipment.¹⁰

The Nationalist government immediately involved itself in the Sichuan Silk Corporation once it relocated to Chongqing. The Central Bank of China, the Bank of China, the Bank of Communications, and the Farmers' Bank of China, the Central

⁷ Yin Liangying, *Sichuan canye gaijinshi*, pp. 371-372.

⁸ Jiang Qingxiang and Li Shouyao, eds. *Sichuan cansiye*, p. 67.

⁹ Jinling daxue wenxueyuan zhengzhi jingjixi, *Sichuansheng Leshanxian sichou chanxiao gaikuang* (General description of the production and marketing of silk in Leshan, Sichuan) (Chengdu: 1940), p. 9.

¹⁰ Sichuansheng shengchan jihua wei yuanhui, ed., *Sichuansheng jingji jianshe sannian jihua caoan* (Draft of the three-year plan of economy of Sichuan), 1940, pp. 1-5.

Trust of China, the Postal Remittance and Saving Bank all invested in the Sichuan Silk Corporation.¹¹ The shares the Nationalist government held in the Corporation reached 30 percent in the autumn 1938, and 51 percent in 1941.¹² Song Ziwen (T. V. Soong), chairman of the board of the Bank of China, Xu Guangzhi, manager of the Chongqing Branch of the Bank of China, and Qian Xinzhi, chairman of the board of the Bank of Communications, and some Nationalist government officials such as He Lian (Franklin Ho) and Xu Kan joined its board.¹³

The Ministry of Finance increasingly intensified state control over exportable Chinese products including silk, as the war progressed. Kong Xiangxi (H. H. Kung) headed the ministry. He had replaced Song Ziwen as the minister in 1933, and occupied the position for 11 years. Kong differed from Song in the conduct of economic policy. Song was inclined to support the Chinese private industrialists and merchants.¹⁴ Kong on the other hand was more interested in enforcing state intervention in the economy at the expense of private enterprise and industry.

The Ministry of Finance controlled China's foreign trade through the Foreign

¹¹ You Shimin, ed., *Sichuan jindai maoyi shiliao*, p. 213; Wen Shaohe, "Huigu Chongqing shengsi shuchuye", p. 425.

¹² Wen Shaohe, "Huigu Chongqing shengsi shuchuye", p. 425. Another source indicated that the percentage of share of the central government was one third in 1938, and 37.4 percent in 1939. See, Zhou Hairuo, Wu Menghui, and Fan Dizhen, "Fan Chongshi yu Sichuan cansang shiye", p. 58.

¹³ Zhou Hairuo, Wu Menghui, and Fan Dizhen, "Fan Chongshi yu Sichuan cansang shiye", p. 58.

¹⁴ Marie-Claire Bergere, *The Golden Age of the Chinese Bourgeoisie, 1911-1937*, trans. Janet Lloyd (Cambridge; New York: Cambridge University Press; Paris : Editions de la Maison des sciences de l'homme, 1989), p. 285; and Margherita Zanasi, *Saving the Nation*, p. 83.

Trade Commission and the companies supervised by the latter, primarily the Fuxing Trading Corporation (Foo shing Trading Corporation), Fuhua Trading Company (Fu Hua Trading Company), and the China National Tea Corporation. The Foreign Trade Commission was first named as the Trade Readjustment Commission under the National Military Council in 1937, and renamed and transferred to the Ministry of Finance in 1938. The Fuxing Trading Corporation was set up in 1939 to deal with the export of wood oil in payment of the Wood Oil Loan that China had negotiated with the United States in 1938. The Fuhua Trading Company was set up by the Military Council in 1937 and was incorporated into the Fuxing Trading Corporation in February 1942. Following this incorporation, the Fuxing Corporation had exclusive rights over the purchase of principal agriculture exports, with the exception of tea, which was handled by the China National Tea Corporation.¹⁵ These companies were organized to function like commercial enterprises, even though they were actually state-owned companies. The Nationalist government appointed government officials as members of the board of trustees, and distributed to them shares corresponding to their government positions and social statuses.¹⁶

The Foreign Trade Commission started purchasing raw silk for export at the beginning of the war, and gradually monopolized the export of raw silk from 1942

¹⁵ The Chinese Ministry of Information, ed., *China Handbook, 1937-1943, A Comprehensive Survey of Major Developments in China in Six Years of War* (New York: The Macmillan Company, 1943), pp. 530-531.

¹⁶ Zheng Huixin, "Fuxing shangye gongsi de chengli yu chuqi jingying huodong" (The establishment and early operation of the Fuxing Trading Corporation), *Jindai zhongguo* 139 (October, 2000), pp. 180, 187-189, 199.

onwards. In that year, the Fuxing Trading Corporation monopolized all the raw silk that the Foreign Trade Commission considered exportable. The free trade of quality raw silk was forbidden, which technically closed the domestic market to the Sichuan Silk Corporation.¹⁷ The policy was legalized as the “Temporary Regulation on the Centralized Purchase and Sale of Raw Silk” (*Quanguo shengsi tonggou tongxiao zhanxing banfa*) in February 1943. The Ministry of Finance authorized the Fuxing Trading Corporation to handle the purchase, transportation, and sale of all improved raw silk and native silk. The purchase price of the raw silk was however decided by the Foreign Trade Commission.¹⁸ The Sichuan Silk Corporation provided the largest portion of improved raw silk to the Foreign Trade Commission from 1937 to 1945. For example, it sold the bulk of its output of over 4,000 piculs of raw silk to the Fuhua Company in 1941, 70 percent of its output in 1942 and 60 percent of its output in 1943 to the Fuxing Trading Corporation.¹⁹

The Leshan Sericulture Experimental Area of the Women’s Advisory Board of the New Life Movement

Other than being involved in sericulture through its investment in the Sichuan Silk Corporation and promulgating various policies on the trade of raw silk and cocoons, the Nationalist government directly participated in the technological transformation of sericulture in Sichuan during the war. Between 1938 and 1945, the

¹⁷ Xu Xinwu, ed., *Zhongguo jindai saosi gongyeshi*, p. 403.

¹⁸ *Cheng bao*, 4 April 1943.

¹⁹ Jiang qingxiang and Li shouyao, eds. *Sichuan cansiye*, pp. 80-82.

Women's Advisory Board of the New Life Movement realized the Leshan Sericulture Experimental Area project in southern Sichuan. The Nationalist government was the chief sponsor of this reform. It is estimated that the Ministry of Agriculture and Forestation funded about 47 percent of the costs, while the Ministry of Finance provided 43 percent.²⁰

However, it is too simple to say that the Nationalist government was the only force behind the establishment of the LSEA. The LSEA was the outcome of the cooperation between the CCP, the Nationalist government, and reformist intellectuals. They all played roles in the shaping and evolution of the LSEA.

Reorganization of the Women's Advisory Board of the New Life Movement, 1938

The Women's Advisory Board of the New Life Movement was the platform on which the LSEA was shaped and developed. The prewar Women's Advisory Board was anti-Communist, and did not encourage production or women's mobilization, and discouraged women's activity in society. The national crisis, however, stimulated the Women's Advisory Board to open its doors to females from various political, economic, social, and religious backgrounds. These females cooperatively shaped a wartime policy that encouraged women to participate in economic production and reconstruction.

The Women's Advisory Board was an essential part of the New Life Movement

²⁰ Chen Ciyu, *Jindai zhongguo de jixie saosi gongye*, p. 260.

that Jiang Jieshi launched in Nanchang, Jiangxi, in February 1934. Song Meiling became director-general of the “Women’s New Life” movement in late 1935²¹, and consequently the New Life Movement established the Women’s Advisory Board in February 1936.²² With the establishment of the Board, Song took over the administrative leadership of the New Life Movement.²³ The Board epitomized many characteristics of the New Life Movement. First, it was anti-Communist. The movement was designed to reconstruct the socio-political order to fight against the influence of the Jiangxi Soviet. The Chinese fascist Blue Shirts were the strong supporters, and probably the “creators”, of the movement. They were deadly enemies of the Communists. Song Meiling was not a sympathizer of the Communists either. War correspondent Freda Utey once recounted that, “in conversation with her (Song) one felt an emotional bitterness on her part towards the Communists and an unwillingness to recognize their merits. Her hatred of those who not only fought against Chiang Kai-shek so long, but who to-day still challenge her own religious and social concepts, obscures her political judgment, which in other respects is so penetrating.”²⁴

At the same time, the Women’s Advisory Board had no significant impact on production. In fact, the New Life Movement on a whole was an ideological campaign

²¹ Tan Sheying, ed., *Zhongguo funü yundong tongshi* (General history of women’s movement in China) (Shanghai: Shanghai Shudian, 1990 [1936]), p. 280.

²² Zhonghua quanguo funü lianhehui, ed., *Zhongguo funü yundong bainian dashiji* (*Chronology of Chinese women’s movement in one hundred years, 1901 - 2000*) (Beijing: Zhongguo funü chubanshe, 2003), p. 87.

²³ James C. Thomson Jr., *While China Faced West, American Reformers in Nationalist China, 1928-1937* (Cambridge: Harvard University Press, 1969), p. 180.

²⁴ Freda Utey, *China at War* (London: Faber and Faber, 1939), p. 198.

that did not affect people's lives tangibly. In 1937, shortly before the outbreak of the war, Song Qingling (Madame Sun Yat-sen) made a comment on the New Life Movement,

“When I consider the New Life Movement I think it unfortunate that, well meaning as the author doubtless meant to be, he has not yet realized that the most fundamental need of the Chinese masses is economic development. In other words, to improve the people's livelihood as Doctor Sun taught. In the New Life Movement there is nothing new to be found, it gives nothing to the people.”²⁵

In addition, the movement promoted the idea of “women retuning home,” instead of encouraging women's independence and emancipation. It argued that women should start reform within their households before they played roles in the public domain. Song Meiling claimed that activities such as “keeping a clean home, and supporting social reform, etc., are women's responsibilities.” However, the reform only encouraged women's domestic role as virtuous wives and good mothers.²⁶ Women's political activity was even more strictly prohibited.²⁷

²⁵ Ibid., p. 15. The Chinese version of this comment is slightly different, but contains the same meaning. See Song Qingling, “Rujiao yu xiandai zhongguo” (Confucianism and modern China), *Song Qingling xuanji* (Selected works of Song Qingling), Song Qingling (Beijing: Renmin chubanshe, 1992), p. 179.

²⁶ Xu Huiqi, “1930 niandai funühuijia lunzhan de shidai beijing jiqi neirong – jianlun nala xingxiang zai qizhong banyan de jiaose” (Context and content of the debate on women's returning home in the 1930s, with a discussion on the role of Nora Helmer in the debate), *Donghua renwen xubao* 4 (July 2002), pp. 112-115.

²⁷ Elisabeth Croll, *Feminism and Socialism in China* (London; Boston: Routledge & K. Paul, 1978), p. 164.

Such narrow concerns held little water with the public with the looming of the Sino-Japanese War. The antagonism between the Nationalist government and the CCP had to be put aside. Economic productivity was the material base of the war. Women's participation in the national salvation movement was inescapable. The New Life Movement was "rapidly transformed into a war relief agency," after the outbreak of war. Madame Chiang dispatched her religious fellow George W. Shepherd to the United States and Britain to seek assistance in 1937.²⁸ Women stood out as active participants of national salvation work. Numerous salvation and relief groups overshadowed the New Life Movement and the Women's Advisory Board. While the United Front publicly favored a united women's mobilization movement, most of these women's organizations lacked a united leadership for the efficient allocation of resources and distribution of work.

Consequently, the Women's Advisory Board held a meeting of female leaders in Lushan, Jiangxi, in May 1938. The meeting was chaired by Song Meiling, and vice-chaired by Wu Yifang, the President of the Jinling Women's College in Nanjing and the first female Chair of the National Christian Council of China. Song Meiling gave an opening speech encouraging cooperation between women and the consolidation of their efforts, and inviting active discussion over the agendas of women's wartime work, mobilization, participation in production, and communication between women's organizations. She also suggested that the

²⁸ James C. Thomson Jr., *While China Faced West*, p. 194.

Women's Advisory Board serve as the platform for a united women's movement.²⁹

She had set her mind on transforming the Board.

Fifty-one female leaders were present at the meeting. They were the most influential and best educated Chinese women at the time. For instance, Zhang Weizhen was the wife of Luo Jialun, the President of the Central University of China. Zheng Yuxiu was the wife of Wei Daoming, secretary-general of the Executive Yuan. Li Dequan was the wife of General Feng Yuxiang. Zhang Suwo was the daughter of General Zhang Zhizhong who had supervised the defense of Shanghai in 1937. Zeng Baosun was the great-granddaughter of Zeng Guofan. There were also female professionals, such as economist Zhang Xiaomei, pediatrician Chen Cuizheng, and educator Yu Qingtang.³⁰

More striking was the presence of distinguished leftists and Communists, such as Shi Liang, Deng Yingchao, and Meng Qingshu. Shi had been jailed by the Nationalist government in the late 1936 because of her anti-Japanese and nationalist activities in Shanghai. Despite seething public indignation and protest, she was not released until end July 1937. Deng was the wife of Zhou Enlai, and Meng was the wife of Wang Ming. Their husbands were top-ranking Communist leaders, and they themselves supervised women's affairs in the CCP.

²⁹ *Xinhua ribao*, May 25 and 26, 1938.

³⁰ Xia Rong, "Song Meiling yu kangzhan chuqi lushan funü tanhuahui" (Song Meiling and the women's Lushan meeting at the beginning of the War of Resistance against Japan), *Minguo dang'an* 1(January 2004), pp. 125-126. Also see *Xinhua ribao*, 8 June 1938.

The CCP was the designer of and champion for the United Front. At the time, the chief theoretician of the United Front, Wang Ming, reached the apogee of his prestige in the CCP, and controlled the CCP.³¹ He believed that national cooperation was a task of the highest priority. His slogans “‘Resisting Japan takes precedence over everything’ and ‘everything must be subordinated to resistance to Japan’ became the CCP’s ubiquitous motto”.³² Before the female communist representatives went to the Lushan meeting, the CCP instructed them, “to utilize the context of the New Life Movement, and to add new contents, to serve the purpose of war mobilization.”³³ This mobilization was meant to unite women from all walks of life.

To fulfill this goal, the Communist representatives supported Song Meiling’s plan to reorganize the Women’s Advisory Board into the central institution of Chinese women’s organizations, while some other representatives dissented.³⁴ During the meeting, they also gave the delegates present an introduction to the women’s movement in the CCP controlled border region of Shaanxi, Gansu, and Ningxia provinces.³⁵ Based on the experience of the Communist women’s movement, they submitted a proposal titled “Our Opinion on Women’s Mobilization in the War”.³⁶

³¹ Shum Kui-Kwong, *The Chinese Communists’ Road to Power*, chapters 1 and 3.

³² *Ibid.*, p. 129.

³³ Liu Jing and Xiao Yang, “Kangzhan chuqi de xinshenghuo yundong funü zhidao weiyuanhui” (The Women’s Advisory Board of the New Life Movement at the beginning of the War of Resistance against Japan), *Wuhan wenshi ziliao* 3(1994), p. 61.

³⁴ Wu Jinlian, “Kangzhan qianqi de ‘fuzhihui’ jiqi huodong” (The Women’s Advisory Board at the early stage of the war of resistance against Japan), *Shanghai shifan daxue xuebao (zhexue shehui kexue ban)* 2(1989), p. 128.

³⁵ *Xinhua ribao*, 10 June 1938.

³⁶ *Ibid.*, 7 June 1938.

Both documents played down class struggle and their contents could appeal to all participants. There were great similarities between this proposal and the finalized guiding principles of the Board, encapsulated in the “Scheme to Mobilize Women to Participate in Anti-Japanese and Nation-Building Work”.³⁷ They envisaged that the realization of the scheme could herald the establishment of a United Front of women. In fact, the scheme was drafted by Sheng Ziji, who was close to the Communists and had joined the CCP in 1939. Deng helped finalize the scheme.³⁸ The scheme discussed the preconditions and methods for the mobilization of women, and formulated practical guidelines on women’s participation in propaganda work, education, relief work, field service, production, etc.

Nothing can more clearly demonstrate the changed agenda and ideology of the Women’s Advisory Board than the “Announcement to Fellow Chinese Women” made during the Lushan meeting. It contrasted sharply with the prewar slogans of the New Life Movement. It now called for all women’s participation in production and construction. Women were not only to be good mothers and wives, but also citizens who could participate in the wartime work both at the front and in the rear. It announces that,

“Women in all social circles, at this time, must contribute, whether much or little. Whether in the countryside or in the city, whether housewives or career women, in the war zones or the Rear Area, all should bear the responsibility

³⁷ *Zhongyang ribao*, 26 and 27 July 1938.

³⁸ Xia Rong, “Song Meiling yu kangzhan chuqi lushan funü tanhuahui”, p. 127.

for the war of resistance and national reconstruction. We should be engaged in medical aid, consolation, donation, relief, child care, propaganda, organization training, and other wartime work, for serving the immediate needs of the war of resistance. In addition, to consolidate the Rear Area, all should also motivate local society, enlighten the masses, publicize the great meaning of patriotism, encourage other women to take up their responsibilities, eradicate traitors, and root out spies. Most of all, to secure the economic basis of the nation, and to strengthen its capacity for long-term resistance, we should in particular engage in production and reconstruction.”³⁹

This idea of economic production and reconstruction was widely shared, not only by the CCP and their leftist supporters who were interested in economic affairs, but also by the Nationalist government. High government officials, such as Kong Xiangxi and Wang Jingwei, enthusiastically called for higher productivity. Kong highlighted the “productive mode of life”, a goal of the New Life Movement that was never pursued before the war. He suggested promoting and improving the handicraft industry and agriculture. Wang Jingwei argued that the New Life Movement, as a spiritual reform movement, and the National Economic Reconstruction Movement, as an economic plan, were two sides of a single project that reinforced each other.⁴⁰

³⁹ *Zhongyang ribao*, 8 and 9 June 1938.

⁴⁰ Kong Xiangxi, “Kangzhan qijian xinyun ying zhuyi zhi dian” (What the New Life needs to focus during the War of Resistance against Japan); and Wang Jingwei, “Kangzhan qijian de xinshenghuo yundong” (the New Life Movement during the War of Resistance against Japan), *Xinyun daobao*, 13(1938), pp. 11-17.

However, it is notable that anti-Japanese production and reconstruction was actually a rather vague idea that involved different strategies and was oriented to different ultimate goals for each of the participating groups. For Wang Ming, who controlled the CCP at the time, democracy and the improvement of people's livelihood were not necessary preconditions for national resistance against Japan.⁴¹ For Mao Zedong, who eventually asserted his tight grip on the CCP from 1939, the United Front supplied not only power to fight against Japan, but also helped to win over supporters against the Nationalists. At the same time, as their wartime policy in Yan'an reflected, the CCP had little technological bases or economic power to aspire beyond their reliance on social and political activities to resolve China's problem.⁴²

For the reformist intellectuals such as Yu Qingtang, increased productivity should be directed at improving people's livelihood.⁴³ These intellectuals possessed technology and skills that was necessary for production. Most of them have accumulated experience through their prewar reform practices. They were the ones who directly guided rural production in the field. However, they had neither political influence nor financial strength, and had to work in certain organizations that could support their activities.

The Nationalist government officials had little interest in women's emancipation

⁴¹ Shum Kui-Kwong, *The Chinese Communists' Road to Power*, p. 123.

⁴² Patricia Stranahan Jackal, "Changes in Policy for Yanan Women, 1935-1947", *Modern China*, 7, 1(January 1981), pp. 88,103.

⁴³ Yu Qingtang, "Xinyun yu zhanshi funü shengchan" (The New Life and wartime women's participation in production) *Xinyun daobao* 22(1939), p. 33.

or the material improvement of people's lives, but paid great attention towards consolidating the material and economic foundations for the resistance against the Japanese invasion. They financed the activities of the Women's Advisory Board. Their economic mobilization was aimed at extracting all possible resources to cover government expenditure and relieve financial difficulty.

Thus, through the Lushan meeting, the Women's Advisory Board was reorganized into a platform where various groups of social, political, and religious backgrounds worked together. It called for nationalistic production that could be identified with all Chinese people. Nevertheless, beneath this superficial consensus, there were distinct divergences that would eventually affect the performance of the subsequent programs of the Board.

For the purpose of working for the nation, the Women's Advisory Board initially set up eight teams and one committee – general affairs, cultural affairs, cadre training, life advisory, production affairs, consolation, childcare, field service teams, and the communication committee. The countryside service team was set up in late 1939, and the field service team was merged with the consolation team in 1941.⁴⁴

The team of production was the center of economic cooperation among the CCP, the Nationalist government, and the non-party intellectuals. During the war, four

⁴⁴ Li Hongmei, "Lun Kangzhan chuqi de 'xinyun fuzhihui'" (The Women's Advisory Board of the New Life Movement at the beginning of the War of Resistance against Japan), *Xi'nan daxue xuebao (renwen shehui kexue ban)* 33, 2 (March 2007), pp. 180-181.

exemplary projects were put into practice, the LSEA, the Songgai Textile Experimental Area, the New Life Women Handicrafts Society, and the Baisha New Life Cotton Mill. The LSEA was the largest among all the production programs of the Women's Advisory Board.

Mass mobilization, 1938 – 1940

Between 1938 and 1941, the overall appeal to national resistance and cooperation overshadowed the differences of the participants of the Women's Advisory Board. This created a rather favorable situation for the shaping and development of the LSEA. The reformist intellectuals in the fields were autonomous in deciding to emphasis on productivity.

Yu Qingtang supervised the production affairs team and established the people-oriented non-profit principle of promoting production. She was an influential Chinese educator trained at Columbia University. She was the chief advocate of mass education, and set up the Jiangsu Provincial School of Education to educate the masses. She was the editor of the "rural life" column of the *Shengbao (Shanghai daily)* in 1935, and had strong sympathy for the peasants and their suffering. According to Yu, the production affairs team should help the nation through benefiting the people materially. The enterprises that the team promoted should involve the large population of rural women, contribute to civil and military needs, and bring in foreign currency. At the same time, she emphasized that these enterprises were aiming at improving women's skills and their lives, and "should not

be for government profit.”⁴⁵

Sericulture matched Yu’s criteria and consequently southern Sichuan was chosen as the location of sericulture experimentation. Southern Sichuan was chosen not only because of the fine natural conditions, but also the depressed state of sericulture then. Reformers considered that the peasants in the region “really need our guidance for improvement. It is imperative.”⁴⁶

The LSEA was established in October 1938. It initially included seven counties – Leshan, Jingyan, Qingshen, Jiajiang, Emei, Meishan, and Qianwei – and was enlarged to cover about 22 counties in southern Sichuan in 1940.⁴⁷ It consisted of a general office, a farm affairs department, and an instruction department. The farm affairs department specialized in nursing mulberry saplings, breeding silkworm eggs, and conducted experiments. The instruction department managed the diffusion of sericulture technology and distribution of improved varieties. It set up instruction stations in counties and towns. There were six instruction stations in four counties in 1939, and the number rapidly increased to 17 in 1941.⁴⁸

Modern sericulturist Fei Dasheng and Zheng Pijiang were the leaders of the LSEA. Fei Dasheng was the director. She was born in a well-educated family. Her parents were in the education business, and her brother was Fei Xiaotong, who was

⁴⁵ Yu Qingtang, “Xinyun yu zhanshi funü shengchan”, pp. 31-34.

⁴⁶ *Funü xinyun* 1(December 1938), p. 62.

⁴⁷ Jiang Qingxiang and Li Shouyao, eds., *Sichuan cansiye*, p. 68.

⁴⁸ *Funü xinyun* 2, 5 (May 1940), p. 14; and 2, 8(August 1940), p. 35.

to later become a renowned sociologist. At the age of 14, she entered the Jiangsu Provincial Girls' Sericulture School to study sericulture. Later, she was sent by the school to pursue further education in Japan between 1920 and 1923. After returning from Japan, she joined her alma mater. Her task was to spread modern sericulture techniques into the countryside. By the outbreak of the war, she had made remarkable achievements in sericulture reform in Kaixiangong village and other factories. Like Yu Qingtang, she was specifically concerned with rural technological and economic improvement.

Zheng Pijiang was the school principal of the Jiangsu Provincial Girls' Sericulture School. He believed in serving national interests through technological education. The education was not for the students in the schools, but also for peasants in the countryside. Therefore, his school set up the department of technological promotion in which Fei Dasheng worked from 1923. After migrating to Sichuan, Yu Qingtang hired him as an advisor to the production affairs team.⁴⁹ More importantly, he reopened the Jiangsu Provincial Girls' Sericulture School as the Jiangsu Provincial Sericulture College in Leshan. The school and the LSEA worked together closely. The LSEA offered scholarships to the students, and was the practice ground of the school.⁵⁰ Zheng also worked as the advisor of the silkworm egg breeding station,

⁴⁹ Tang Xiaochun, *Renmin jiaoyujia Yu Qingtang* (Biography of Yu Qingtang, people's educator) (Nanjing: Jiangsu wenshi ziliao bianjibu, 1998), p. 133.

⁵⁰ Xinyun funü zhidao weiyuanhui ed., *Xinyun funü zhidao weiyuanhui gongzuo banian* (Eight years of the Women's Advisory Board) (Nanjing: 1946), p. 117; and *Funü xinyun* 3 (June 1939), p. 42.

whose technicians were all graduates of the school.⁵¹

The LSEA was also staffed by specially trained women cadres. The Women's Advisory Board considered the existence of qualified cadres as a precondition for women's mobilization.⁵² Liu Qingyang, who joined in the CCP in 1921, was in charge of cadre training. She clearly stated that "I want to train the cadres into ones who can serve people and die for the country." During the early stage of the war, the Communists played an important role in steering the training programs. Deng Yingchao and Zhou Enlai participated as lecturers, while underground CCP members such as Xia Yingzhe and Feng Guangguan facilitated the CCP's activities as secretaries in the team.⁵³ At least eight students from the training programs were assigned to the LSEA.⁵⁴

This leadership carried out a series of activities for the purposes of technological transfer and nationalistic mobilization immediately after it was established. It started with work-study programs. For example, from October 1938 to January 1939, Fei Dasheng taught 21 housewives how to make silk wadding. Later, the reeling training program began in December 1938. A total of 160 women entered the two programs and 132 graduated in 1938 and 1939.⁵⁵ The LSEA reported this initial enrolment as

⁵¹ Interview with Zhang Maolin, 26 June 2009.

⁵² *Zhongyang ribao*, 9 June 1938.

⁵³ Liu Qingyang, "Huiyi xinyun funü zhidao weiyuanhui xunlianzu" (Recollection of the team of cadre training of the Women's Advisory Board), *Wuhan wenshi ziliao* 8 (August 2005), pp. 4-7.

⁵⁴ *Funü xinyun* 2, 5 (May 1940), p. 37.

⁵⁵ *Ibid.*, pp. 35, 38; and *Xinyun funü zhidao weiyuanhui sanzhounian jinian tekan* (Special issue of the third anniversary of the Women's Advisory Board) (1941), p. 59.

proof that “women in Leshan have woken up!”⁵⁶

From 16 October 1939 onwards, the project carried out more ambitious sericulture training programs, which combined nationalistic and sericulture education. A centralized program in Leshan was designed to train leaders in the rural sericulture cooperatives. The curriculum included modern sericulture knowledge, Chinese literature, math, accounting, as well as a special course called “citizenship”. Decentralized trainings were conducted by individual instruction stations from the late October 1939 onwards. Besides studying elementary sericulture knowledge, women had to learn “Elementary Knowledge of the War of Resistance against Japan”.⁵⁷ A total of 1655 women received the decentralized training between 1939 and 1940.⁵⁸

Its grandest contribution was to push substantive sericulture reform into the countryside. In actual practice, the reformers significantly downplayed propaganda dissemination in the countryside, but primarily focused on rural development. The reformers considered that increasing productivity was a more practical way of enhancing the strength of China’s resistance effort, as opposed to relying on empty rhetoric. These instruction stations adhered to elaborate annual programs for technological diffusion, none of which deliberately stressed on masses’

⁵⁶ *Funü xinyun* (December 1938), p 64.

⁵⁷ *Ibid.*, 2, 2 (February 1940), p 16; 3 (June 1939), p 42.

⁵⁸ *Xinyun funü zhidao weiyuanhui*, ed., *Xinyun funü zhidao weiyuanhui gongzuo banian*, p. 59.

mobilization.⁵⁹

In fact, there was hardly any time for the instructors to spread nationalistic propaganda in the countryside. Already, they complained that they had not enough time to spread technology and techniques in rural southern Sichuan. The residential pattern in Sichuan frustrated their work. Unlike the nucleated village in other parts of China, Sichuan villages are unique in their dispersed village community.⁶⁰ This aggravated the difficulty of introducing sericulture knowledge into the rural society. “Although we travel as much as thirty to forty *li* a day, the households that can receive instruction are no more than only forty to fifty.”⁶¹

In addition, the LSEA distributed sericulture manuals and organized sericulture exhibitions to spread modern technology. Thousands of copies of manuals were distributed to farmers. After silkworm seasons, the LSEA arranged for travelling exhibitions. These exhibitions introduced modern mulberry cultivation, disinfection practices, silkworm rearing, mulberry experiments, silkworm mounting, reeling and wadding making. The exhibitions travelled to eight places in seven counties and attracted 27,000 visitors in 10 days in 1940.⁶²

In light of the short history of improved silkworm rearing in the region, the

⁵⁹ *Funü xinyun* 2, 2 (February 1940), p. 16; 2, 5 (May 1940), pp. 16-18.

⁶⁰ William G. Skinner, “Marketing and Social Structure in Rural China: Part I”, p. 6. Also see Philip C. C. Huang. *The Peasant Economy and Social Change in North China*, p. 65; and Wang Di, *Street Culture in Chengdu: Public Space, Urban Commoners, and Local Politics, 1870 – 1930* (Stanford: California: Stanford University Press, 2003), p. 4.

⁶¹ *Funü xinyun* 2, 2 (February 1940), p. 16.

⁶² *Ibid.*, 2, 2 (February 1940), p. 17; 2, 5 (May 1940), p 34.

growth was significant. Large-scale promotion of improved silkworm varieties had not been conducted in southern Sichuan before 1939. According to estimates, less than 3,000 improved egg cards had been distributed in the region by 1939.⁶³ Another source calculates that only 546 households raised improved silkworm varieties in spring 1937 and 155 households raised autumn crops in 1936 and 1937.⁶⁴ By contrast, 20,000 egg cards were distributed to 6,757 households free of charge in spring 1939 and 18,458 autumn silkworm egg cards to 3,838 households the same year. The total output of improved cocoons reached 316,370 kilograms.⁶⁵

Despite the efforts to integrate nationalistic ideas into production, economic gain was the only motivation behind the peasants' acceptance of the reforms. Wild claims that the "women in Leshan have woken up" as proposed by the *Funü xinyun*, an organ of the Women's Advisory Board, at the end 1938, were unsubstantiated. In reality, the peasants, including women in Leshan, were suspicious of the reforms and possessed even less respect for slogans such as "serving the nation" or "saving the nation". The peasants thought the government were only interested in coercing them to sell the improved cocoons at low prices. They only took the new varieties when the LSEA guaranteed the free trade of improved cocoons.⁶⁶ Ironically, they did not

⁶³ Ibid., 2, 5 (May 1940), p. 16. But other document suggests that a total of 3,424 improved egg cards were distributed in the southern Sichuan in 1936 and 1937, and 5,350 cards in the spring of 1938. See Chen Ciyu, *Jindai Zhongguo de jixie saosi gongye*, p. 253.

⁶⁴ Yin Liangying, *Sichuan canye gaijinshi*, pp. 234 -240.

⁶⁵ *Funü xinyun* 4 and 5(December 1939), pp. 45-47.

⁶⁶ *Zhongyang ribao*, 11 December 1939; and Yu Guangtong, *Canhun – Fei Dasheng zhuan* (The spirit of silkworm, biography of Fei Dasheng) (Suzhou: Suzhou University Press, 2002), p. 121.

trust the new varieties either. They were afraid the new variety did not yield well and would reduce their income. Even when they received the free improved silkworm eggs, many raised improved silkworms alongside native silkworms in case the new varieties did not work.

It was the subsequent good yields that won over the peasants. In 1939, the improved silkworm variety was exceptionally profitable for the silkworm raisers. In the spring of that year, native silkworm raisers suffered heavily because of widespread silkworm diseases. The average output from native egg cards was only 4 kilograms. In contrast, led by the LSEA, improved silkworm raisers managed to garner a fair harvest. On average one card of improved silkworm eggs yielded 6.51 kilograms of cocoons worth \$6.51. In autumn, one improved card yielded 9.370 kilograms worth \$18.74. On average, every household received \$19.07 from the spring crop and \$45.26 from the autumn crop, a large sum of money. In the market of Chengdu, the provincial capital, in October 1939, a picul of rice cost \$15.94, and a picul of wheat, \$10.50. The price was even lower in Chongqing at \$12.58 and \$9.73 respectively.⁶⁷

The responses of the local society and people prove how much they were impressed by the advantages brought by the LSEA. County governments, agricultural societies, as well as peasants sent letters to the LSEA. They appealed to the LSEA to set up more instruction stations, to dispatch instructors, to teach skills, and to

⁶⁷ Meng Tianzhen and Chen Caizhang, eds., *Zhanshi wujia teji* (Special issue of wartime price) (Chongqing: Zhongyang yinhang jingji yanjiuchu, 1942), p. 26.

distribute more improved varieties.⁶⁸ Reformists were welcomed in the countryside. Fei once told the *Zhongyang ribao* (*Central daily news*) that instructors were welcomed and treated as “living Buddhas” in villages after the reforms had proved beneficial. The villagers even asked the instructors to mediate domestic disputes, to provide medical treatment to the sickness, and to resolve other domestic issues.⁶⁹ Nevertheless, there is no trace of nationalism in their acceptance of the new techniques and technology.

An Extraction-based economy, 1941 – 1945

The cooperation between the CCP and the Nationalist government broke down in 1941. Between 1941 and 1945, the LSEA continued operating under the broad auspices of the New Life Movement. But the Nationalist government adopted a strategy of extraction towards sericulture, which was very different from the previous people-oriented non-profiteering guidelines set up by Yu Qingtang. At this stage, the Communists’ influence shrunk to insignificant levels, and the reformist intellectuals struggled to strike a balance between their own economic ideas and ever-increasing governmental economic demand.

The United Front between the Nationalist government and Communists was not stable from the beginning. Their cooperation was induced by the fervor of national salvation and anti-Japanese sentiments at the onset of the war. The Nationalist

⁶⁸ *Funü xinyun* 2,5(May 1940), p. 28.

⁶⁹ *Zhongyang ribao*, 18 December 1939.

government had been suspicious of the Communists' mobilization of the masses from the beginning, believing that it was leading to the creation of hotbeds of Communism.⁷⁰ The hostilities accumulated and climaxed with the military conflict between the Communists and the Nationalists during the New Fourth Army Incident in southern Anhui in January 1941. The military United Front was destroyed, and the uneasy truce between the two parties ended.

At the same time, the Nationalist government gradually restored its prewar policies concerning women's mobilization. There were cases of women being removed and expelled from government positions in Fujian and Hunan in 1939.⁷¹ In November 1940, the Guomintang Women's Commission circulated a manual, produced by its Zhejiang executive council, on preventing "illegal women's movement". This manual categorized a number of illegal activities, such as female cadre training, countryside service, as well as activities against "women returning home". Five months later, the director of the Department of the Organizational Affairs of the Guomintang gave a speech to a national meeting of women cadres. The speech encouraged women to stay home.⁷² Hence, the Guomintang

⁷⁰ "Junshi weiyuanhui diaocha tongjiju fujuzhang Dai Li cheng Jiang weiyuanzhang baogao" (Report of Dai Li to Jiang Jieshi) (8 August 1938), cited in Huang Kun, "Guomintang wujie wuzhong quanwei yu guogong guanxibianhua zhi fenxi" (Fifth Plenary Session of the Fifth Central Committee of the Guomintang and the change of the GMD-CCP relations), *Dangshi yanjiu yu jiaoxue* 6 (2002), p.58.

⁷¹ Liang Keping, "Kangzhan shiqi de funü kanwu" (Women's journals during the War of Resistance against Japan), in *Kanri zhanzheng shiqi de zhongguo xinwenjie* (The Chinese media during the War of Resistance against Japan), ed., *Zhongguo sheke yuan xinwen yanjiusuo* (Chongqing: Chongqing Press, 1987), pp. 256-257.

⁷² Zhonghua quanguo funü lianhehui, ed., *Zhongguo funü yundong bainian dashiji*, pp. 106-107.

government officially disapproved of the women's movement.

Inside the Women's Advisory Board, the pressure on radical leaders and women's activities increased. The Guomindang tried to recruit Yu Qingtang several times. Yu was stressed by the great pressure of managing governmental relations within the Board, and left the position of chief of the production affairs team as early as March 1939.⁷³ Liu Qingyang's training of cadres similarly faced political intervention and obstruction from 1939 onwards. She managed however to continue working in the Women's Advisory Board till May 1941.⁷⁴ Shi Liang on the other hand left the Board in 1942.⁷⁵ Female activists were regarded with suspicion and their identities were frequently checked.⁷⁶ The CCP had to withdraw its members whose identities had probably been exposed from the Board after the New Fourth Army Incident. The anti-Communist shadow of the Nationalist government extended to the LSEA too. The Ministry of Education required the school president Zheng Pijiang to join the Guomindang.⁷⁷ A radical student of the sericulture school was arrested. Apparently, the Communist and their leftist supporters faced strong suppression in the LSEA at the time.

However, as observed by historian Chen Ciyu, the LSEA became the focus of the

⁷³ Tang Xiaochun, *Renmin jiaoyujia Yu Qingtang*, p. 139.

⁷⁴ Liu Qingyang, "Huiyi xinyun funü zhidao weiyuanhui xunlianzu", pp. 8-9.

⁷⁵ *Kaiguo yuanxun: gongheguo shoujie zhengyao jishi* (Report on the high government officials of the first term in the People's Republic of China), vol.2, (Beijing: Dangdai zhongguo chubanshe, 1999), p. 961.

⁷⁶ Guo Jian, "Song Meiling dongyuan wo jiaru Guomindang" (Song Meiling mobilized me to join the Guomindang), *Bainianchao* 5(1998), pp. 60-65.

⁷⁷ Yu Guangtong, *Canhun*, p. 129.

sericultural promotion of the Nationalist government after 1941. It demonstrated sustained development in mulberry cultivation, silkworm egg production, cocoon output, and silk goods production. Chen concludes, "In contrast to the decline of the provincial Sericulture Reform Base [that was studied in chapter 7 and supervised reform in northern and eastern Sichuan during the war], the LSEA was like the axis of Sichuan sericulture at the late period of the War. Its development is critical to sericulture in Sichuan and even contemporary China."⁷⁸

First, the LSEA became capable of producing fine mulberry and silkworm varieties between 1941 and 1945. The farm affairs department set up silkworm egg breeding stations in 1940 and started producing improved egg cards in 1941. The LSEA's Suqi and Jiayang silkworm breeding stations were the largest providers of improved egg cards in the region. Mulberry sapling cultivation was conducted along with silkworm egg production. By 1942, the mulberry saplings produced in the LSEA had accounted for about half of the total output in the whole province.⁷⁹

Second, the LSEA started reeling raw silk after 1941 through directly controlled factories and rural cooperatives. It took over the Huaxin Filature, the largest and earliest steam filature in the region. Later, it also supervised the Fengxiang Filature in Leshan and the Tengchuan Maoji Filature in Junlian county.⁸⁰ These filatures were the only steam filatures in operation in the region at the time. The government

⁷⁸ Chen Ciyu, *Jindai Zhongguo de Jiexie saosi gongye*, p. 266.

⁷⁹ Yin Liangying, *Sichuan canye gaijinshi*, p. 162.

⁸⁰ Yu Guangtong, *Canhun*, p. 122; and Chen Ciyu, *Jindai Zhongguo de Jiexie saosi gongye*, p. 270.

assigned to the three filatures the tasks of reeling export silk. From 1942 to 1945, they produced 77.5 tons of raw silk in total. It also had two factories producing silk wadding from wasted cocoons. They produced only 1,017.93 catties of wadding and 48 wadding quilts in 1941, but by 1944, their productivity reached 16,784.76 catties of wadding and 275 wadding quilts.⁸¹

Rural silk production and marketing cooperatives were established in the countryside from 1941. Fei Dasheng was the strong supporter of rural production cooperatives. When she spread modern sericulture techniques in Kaixiangong, Jiangsu, she organized peasants to set up a rural sericultural cooperative, the first of its type in Chinese history.⁸² In 1932, she published an article to advocate “rural small-scale silk reeling cooperatives”.⁸³ The Nationalist government, at the time, was also interested in and actively encouraged the establishment of cooperatives. The LSEA led by Fei Dasheng took this opportunity and eagerly promoted sericulture cooperatives. The first two cooperatives were set up in Qingshen in 1941, with 360 members. By 1943, there had been 18 cooperatives with 3,776 members in seven counties in the LSEA. The silk production and marketing cooperatives in the LSEA were similar to that in Kaixiangong. They combined mulberry cultivation, silkworm raising, cocoon drying, silk reeling, and the shipping of goods.⁸⁴ As with the silk

⁸¹ Chen Ciyu, *Jindai Zhongguo de Jiexie saosi gongye*, pp. 258, 271.

⁸² Hsiao-tung Fei, *Peasant Life in China*, pp. 223-224.

⁸³ Fei Dasheng, “Tichang xiangchun xiaoguimo zhisi hezuoshe” (Advocacy of rural small-scale silk reeling cooperatives), *Guoji maoyi dabao* (International trade herald) 4,6 (1932).

⁸⁴ Xinchenghuo yundong cujin zonghui ed., *Xinyun shinian* (Ten years of the New Life Movement) (Chongqing, 1944), p. 99; Jingyanxian zhengxie wenshi ziliao weiyuanhui,

cooperative in Kaixiangong, members benefited from joining the cooperatives. They received quite high financial returns by selling cocoons to the cooperatives and drawing profit dividends from raw silk.⁸⁵

Despite all the efforts Fei Dasheng and her staff made in improving technology by utilizing governmental policy, a close scrutiny of these significant achievements shows that the project benefited the Nationalist government more than it did the majority of petty producers. In many ways, the reformers of the LSEA became the employees of the Nationalist government and had to adhere to government policies with scarce autonomy to conduct reform that could benefit a larger rural population. Their vision of rural development was subordinated to the government's direction of the extraction of resources from the economy without being concerned with how it was achieved. The interests of the peasants were neglected in the pursuit of governmental profit, which put the reformers in a great quandary.

The Foreign Trade Commission of the Ministry of Finance adopted a monopolization policy towards the trade in raw silk.⁸⁶ This policy had strong impact on the productivity of the Sichuan Silk Corporation, since the latter was the major supplier of filature silk. The LSEA was less affected by the compulsory sale of raw silk because its output was already produced under the commission of the Foreign Trade Commission under commission.⁸⁷ However, the 1942 and 1943 centralized trading

ed., *Jingyan cansi yitiaolong*, pp. 15-16.

⁸⁵ Chen Ciyu, *Jindai Zhongguo de Jiexie saosi gongye*, pp. 269-270.

⁸⁶ Jiang Qingxiang and Li Shouyao, eds., *Sichuan cansiye*, pp. 78-82.

⁸⁷ *Cheng Bao*, 4, 6, and 15 April 1943.

policy still bore strong impact on the local reeling industry. To secure raw materials, the LSEA monopolized the right to purchase all improved cocoons. Even the right to purchase native-bred cocoons was restricted to the LSEA and the silk reeling firms that were issued native cocoon purchase licenses. Peasants were furthermore banned from using large frames to reel domestic silk.⁸⁸ This policy did not increase the technological level of local production, but added more impediments to the productivity of the silk reeling factories, as well as the peasants who wanted to generate more profit from domestic reeling.

The cooperatives were not perfectly efficacious either. As in other regions, the Nationalist government-led cooperatives hardly assisted the common peasantry.⁸⁹ Over 80 percent of the loans provided by the Peasant Bank in Leshan in 1943 went to the transportation sector rather than the production sector. The loans benefited primarily the richer classes, due to the limited amount of loans available, the complicated application procedure, the peasants' illiteracy, and strict requirements on guarantors. Cooperatives were partly organized under the sponsorship of the country government. The powerful and influential local leaders took the important positions, with the result that the common members "could not and dared not" participate in the management of the cooperatives.⁹⁰ A local contemporary

⁸⁸ Archives of Leshan, 6 – 2 – 159.

⁸⁹ Wei Benquan, "Ershi shiji shangbanye de nongcun hezuohua, yi minguo Jiangxi nongcun hezuo yundong wei zhongxin de kaocha" (Rural cooperative in the first half of the twentieth century of China, the case in Jiangxi), *Zhongguo nongshi* 24, 4 (2005), pp. 88-96.

⁹⁰ Sichuansheng sichou gongsi, *Sichuan sichou shiliao*, vol.5, p. 1522.

cooperative leader, Feng Qiunong, testified that the membership of the cooperatives was mainly composed of middle class peasants, as well as quite a few rich peasants and landlords. He even argues that the cooperatives did not benefit the poor peasants at all.⁹¹

Meanwhile, non-members of cooperatives possessed less advantage in producing improved cocoons than cooperative members. The cooperative members dominated the rearing of improved silkworm. For instance, they raised 69 percent of the improved silkworm crop in spring 1943.⁹² But the cooperative members constituted only a small fraction of the large rural population, and not all peasants were qualified or able to join cooperatives. The dominance of cooperative members in raising improved varieties indicates that the non-members were reluctant to do so. Cost was the critical factor that determined the peasants' choice. The LSEA withdrew the guarantee of a free market for improved cocoons in the 1940s.⁹³ The government controlled the market of improved cocoons and purchased cocoons

⁹¹ Feng Jiunong, "Wo'men zaoyudao de jige shiji wenti" (Several problems we encountered), *Sichuan hezuo jinrong jikan* 4 and 5 (June and September, 1941), pp. 54-59.

⁹² Chen Ciyu, *Jindai Zhongguo de Jiexie saosi gongye*, p. 270.

⁹³ I do not find any record on when the policy of free-marketing of improved cocoons was abolished in the LSEA. The Sichuan Silk Company that controlled most filatures in Sichuan monopolized the purchase of improved cocoons in eastern and northern Sichuan from 1937 to 1943. But it had no right to purchase improved cocoons in southern Sichuan since the LSEA was established. See Zhou Hairuo, Wu Menghui, and Fan Dizhen, "Fan Chongshi yu Sichuan cansang shiye", p. 59. The LSEA's monopoly on improved cocoons in southern Sichuan probably started in 1943, when the "Temporary Regulation of Centralized Purchase and Selling of Raw Silk" was enacted. It could happen earlier, when it took over the Huaxin Filature and started filature reeling in 1942. But it was of low possibility that monopoly over improved cocoons started before 1941.

from peasants at a fixed price much lower than the market price and the cost price of production. For example, the official price of improved cocoons differed over five grades in 1943, ranging from \$60 to \$80 per kilogram respectively. In contrast, the black market price in Leshan was about 180 dollars per kilogram.⁹⁴ For the non-cooperative members, they could only gain profit by selling cocoons in the black market, which might be dangerous. Compounded with the inflation, many peasants either stopped raising silkworms or returned to raising native varieties.

The native varieties were still in predominance during the War. According to Chen Ciyu, the average annual output in the region of improved cocoons was 404.364 tons, in sharp contrast to 3,414.553 tons of native cocoons.⁹⁵ And the annual output of both kinds of cocoons was far less than that in the prewar years. The LSEA's endeavor to improve productivity actually achieved limited impact.

Conclusion

The anti-Japanese war was the most radical phase of sericulture technological transformation in pre-1949 Sichuan. While the Sericulture Reform Base continued to operate in northern and eastern Sichuan under the aegis of the Sichuan provincial government, the Women's Advisory Board of the New Life Movement set up the LSEA to conduct sericulture reform in the southern Sichuan. The two projects covered almost all the counties where sericulture was important to the local

⁹⁴ Sichuansheng difangzhi bianzhan weiyuanhui, ed., *Sichuan shengzhi, sichouzhi*, p. 363.

⁹⁵ Chen Ciyu, *Jindai Zhongguo de Jiexie saosi gongye*, p. 267, note 30.

economy.

The LSEA represented an unusual case where different groups cooperated in economic production. In spite of the consensus of production for the national resistance, these groups further defined their approaches in light of their own identities and agendas. The female leaders of different backgrounds were united under the consensus in the Lushan meeting in May, 1938. Their approaches and ultimate goals imposed by their background, however, often conflicted among each other. Sericulture reform was actually the site of a tussle between political power, economic power and intellectual power. Between 1938 and 1941, their cooperation went relatively smoothly despite an undercurrent of competitions and suspicion. The change of political climate following the military collision in early 1941, however, dissolved the cooperation. It not only pushed the CCP out of the reform movement, but also subordinated the rural reformers to the extraction-based economy.

In terms of the acceptance of producers on the sericulture reform, these groups' individual interpretation on production and productivity stimulated different responses. The peasants produced for themselves. Their activity did not answer to the CCP's call for national resistance and mass mobilization, nor helped to expand the CCP's influence. The extraction-based economic policy of the Nationalist government largely harmed the interests of the peasants and other petty producers in production. The reformist intellectuals' prioritization of the improvement of people's livelihoods through reforming technology, by contrast, was the most

appealing to the producers. But these intellectuals were also the ones who held the least political and economic power. Their performance depended greatly on the relationship between, and the policies of the other two groups.

As a result of the ideological and political conflicts, the outcome of sericulture reform was not as desirable as originally anticipated. Modern technologies did not supersede indigenous technology in southern Sichuan. Although there was not significant involvement of the CCP in the provincial Sericulture Reform Base, the conflicting ideas and practices between the government and the reformist intellectuals were not less intensive than in the LSEA. The economic extraction policy of the Nationalist government and the provincial government counteracted the reformative efforts of the reformers. Despite the general enthusiasm and consensus behind utilizing sericulture to serve anti-Japanese goals, the reform attempt to transform traditional and indigenous sericulture practice into a modern one achieved only limited success in wartime Sichuan.

EPILOGUE

Paths of Technological Development

Japanese Emperor Hirohito broadcasted surrender in Japan on 15 August 1945, and the formal Japanese surrender in China took place on 9 September, ending the Second Sino-Japanese War. However, the end of the war was more of a catastrophe than a boon to sericulture in Sichuan. It was only after 1949, when the CCP took over Sichuan, that sericulture in the province began to experience another round of rapid reform. This Communist government-led reform followed the strategy shaped in the 1930s that stressed on governmental intervention in diffusing foreign modern technology, played down the role of local elites, and denigrated indigenous traditional technology as backward.

After the end of the war, immigrants, refugees, relocated factories, institutes, and the central Nationalist government returned to their original locations from interior China. The central government returned its focus on sericulture to the lower Yangzi delta. In 1945, the central government established the Raw Silk Company of China to take over the management of sericulture institutions in Japanese-occupied areas. Policies on rehabilitating sericulture in these regions were made. The management of sericulture and sericulture technology was returned to the hands of local government and society of Sichuan.

The state of sericulture in Sichuan was unpromising, having suffered neglect

from the central government, strong competition in international and domestic markets, the unstable economy, and inflation. According to the records of the Sichuan Silk Corporation, the output of filature silk in Sichuan was 1142 piculs in 1946, 1391 in 1947, 1217 in 1948, and only 51 in 1949.¹ The export of Sichuan raw silk was even lower. Between 1945 and 1949, the highest volume of export was in 1947, totaling a mere amount of 980 piculs.² Domestic consumption of raw silk was constrained by shrinking demand from the weaving industry. The largest silk weaving factory in Sichuan during the war, the Meiya Silk Goods Manufactory, suddenly decreased its output from 1000 bolts per month to 500 bolts per month immediately after the victory.³ The number of looms in Leshan decreased from over 2,000 to a little over 500 in 1947.⁴

Under such dire circumstances, the development and diffusion of sericulture technology was greatly impeded in Sichuan between 1945 and 1949. This is notwithstanding the knowledge and experts in modern sericulture that Sichuan had indeed accumulated by the mid-1940s. The local communities could continue producing improved silkworm eggs. For example, the LSEA was transferred to the Leshan local government after the war. The local elites bought over the silkworm breeding stations of the LSEA and planned to produce improved varieties by

¹ Xu Xinwu, ed., *Zhongguo jindai saosi gongyeshi*, p. 471, note 2.

² Sichuansheng difangzhi bianzhuan weiyuanhui, ed., *Sichuan shengzhi, sichouzhishi*, p. 250.

³ Liu Fangjian, Li Yunyuan, and Zhong Zhen, “1945 – 1949 nian Sichuan jingji jishi ziliao zhailu” (Chronology of economy of Sichuan, 1945 – 1949: part 1), *Sichuan wenshi ziliao xuanj* 39 (1991), p. 174.

⁴ *Cheng Bao*, 11 February 1947.

themselves.⁵ The Sichuan Silk Corporation also continued producing improved egg cards. However, the output of improved egg cards shrunk rapidly. Only 260,382 improved egg cards were produced in total in Sichuan in 1949, while 488,792 cards were produced in 1945.⁶ Although the advantages of multi-ends reeling machines were recognized, and their use gradually adopted in both private filatures and the Sichuan Silk Corporation, the overall impact should not be over-estimated. The Minjiang Raw Silk Company established 120 simplified multi-ends reeling machines in Leshan 1948. It was probably the most advanced filature in the region at the time, but the machines were only a simplified version of advanced and efficient multi-ends machines.⁷ Similarly, the multi-ends reeling machines possessed by the Southern Sichuan Raw Silk Company in 1947 was only coarse wooden machines that could not perform as well as authentic multi-ends machine.⁸ Ultimately, the rural diffusion of sericulture technology suffered from the lack of funding and staff. There were only 20 technicians in the Sichuan provincial Sericulture Reform Base after 1946.⁹

The Communist government reversed the decline of sericulture in Sichuan after 1950. It nationalized the marketing and distribution of cocoons and raw silk, and carried out sericulture technological innovation and diffusion through various

⁵ Archives of Leshan, 6 – 1 – 270.

⁶ Sichuansheng difangzhi bianzhuan weiyuanhui, ed., *Sichuan shengzhi, sichouzhishi*, p. 76.

⁷ Yang Maoru, Feng Deliang, and Liang Renzhi, “Minjian cansi gufen youxian gongsi kaikuang” (General description of the Minjiang Silk Company, Ltd.), *Leshanshi shizhongqu wenshi ziliao xuanji* 1, p. 8.

⁸ Archives of Leshan, 6 -1-193.

⁹ Sichuansheng difangzhi bianzhuan weiyuanhui, ed., *Sichuan shengzhi, sichouzhishi*, p. 315.

agencies. The Southwest Military and Administrative Commission was set up in the late 1949. Its jurisdiction included Sichuan, Yunnan, Guizhou, Xikang, and Tibet. The Bureau of the Sericulture of Southwest China was established in 1951, under the supervision of the Trade Department of Southwest China. The Bureau controlled sericulture in southwestern China. It immediately set up 77 sericulture instruction stations in southwestern China, primarily in Sichuan. The provincial and local governments carried out educational programs to train sericulture leaders. An estimated 100,000 people received training between 1952 and 1955. By 1956, the Sichuan Silk Corporation alone had the ability to produce 729,800 improved silkworm egg cards. From 1953, silkworm of the late autumn crop variety were distributed and promoted. Hence three crops of cocoons became possible. The percentage of multi-ends reeling machines used in filatures soon increased from 20 percent to 80 percent in 1952, backed by large amounts of government investment. Automatic silk reeling machines were further introduced into Sichuan in 1954 and 1955.¹⁰ There was direct government intervention along a clear direction of modernizing traditional sericulture technology.

The strategies the Communist authorities adopted were not much different from the Nationalist government's approach, but were more thorough and grander than any other reform effort in the past half a century. The CCP government carried out the diffusion of sericulture technology with careful plans. The new and advanced technologies relentlessly replaced indigenous methods of sericulture production that

¹⁰ *Ibid.*, pp. 38, 76, 59, 277, 350.

was regarded as backward. That is not to assert that the natives were not responsible for any technological improvement. However, these improvements were based on rational and scientific principles, which were very different from the traditional practices and customs.

This work is primarily a case study of technological development in the production of a single type of commodity in a Chinese region. The regional and technological characteristics of sericulture in Sichuan render it unique as a case study. Sericulture activities were carried out within special regional, historical, economic, social, and cultural settings that could not be replicated in any other part of China or the world. Rather than recording and edifying an exhilarating course towards modernization, the work introduces an unsuccessful case of modern technological diffusion. Modern technology never became dominant in Sichuan during the first half of the twentieth century, which was dwarfed by wider and more rapid adoption of improved varieties and mechanized production of sericulture in the coastal China.

However, the implication of this case study resides not in the documentation and demonstration of the experience of a particular region or specific industry, but in the reflections it entails for broader trends within the history of China or even the world. How are the various efforts to reform sericulture in a single region relevant to broad trends in China's modern experience? How does the record of technological diffusion in Sichuan sericulture reflect the transformation of traditional handicraft

industry in the rest of China, or the world?

In Sichuan, sericulture development involved the interaction of the local elites, the imperial and Republican local, provincial and central governments, reformist intellectuals, foreign investors, the Communists, as well as the peasants. These participants were common actors in any landscape of modern China.

The local elites were often active participants in social, cultural, economic, and political realms. Their involvement in local society often implicated the theme of “civil society”. Although there are still debates on the existence of civil society as defined by Thomas Hobbes in China, the essential characteristic of civil society is the functioning of private agencies and agents in society. In this sense, the involvement of non-government actors in sericulture technological reform in the late Qing and early Republican Sichuan could be characterized as the autonomous actions of civil society. These civil society groups were quite active at that time, but also rather weak in confronting the civil or military authorities. They were not as much the government’s challengers as its collaborators. Their leaders, such as Zhang Senkai and Chen Wanxi at the end of the Qing dynasty, and Cheng Timing and Zhang Lan during the warlord era, were all semi-gentry holding certain government titles or positions and tightly connected with the government. When competition between civil society and the government appeared in the 1930s, the civil society soon lost its voice. As a matter of fact, the elites who demonstrated in Sichuan sericulture shared some similarities with the salt merchants of Tianjin, who “were motivated less by a

desire to compete against the state than a complex of economic, culture, social, and psychological reason.”¹¹

Studying the course of sericulture reform in Sichuan contributed some new perspectives to the discussion of the state involution and devolution. Like the case of the Huang-yun region studied by Kenneth Pomeranz, both the devolution and involution of the Chinese state bore impact on the core-periphery status of Sichuan. More significantly, no other region in China has experienced the same frequency of shifts in its status as core or as periphery within the national political system as Sichuan had. The state must extend its influence and control over local society through its local agencies and agents. Its involvement in reform at the local level depended on how much its power could be extended to the locality. Just as it had caused ignorance and decline in the Huang-yun region, state devolution also contributed to the lag in the technological transformation of Sichuan sericulture during the early republic, and the decline of its sericulture between 1945 and 1949. At the same time, state involution was not always detrimental to the local economy and conditions. State involution stimulated the first wave of technological improvement in the last decade of the Qing, and significant modern technological diffusion during the Second Sino-Japanese War.

Chinese reformers had been obsessed with the question of how to reform China's countryside since the early twentieth century. James Yen and Liang Shuming

¹¹ Kwan Man Bun, *The Salt Merchants of Tianjin: State-making and Civil Society in Late Imperial China* (Honolulu: University of Hawaii Press, 2001), p 154.

advocated rural education to enlighten peasants for a better countryside. The prewar New Life Movement hoped to improve the moral values of landlords to achieve a fair distribution of resources and profits between the cultivators and owners of the land. The CCP promoted radical land reform to cure the fundamental disease of poverty of villages, with little impact on technological reform before 1949. Fei Xiaotong and many intellectual reformers considered technology to be the mean of saving the Chinese countryside. The case of the LSEA during the war contributes to the study on China's rural reform with a unique case of the participation of various reform groups within a reform in a single locality. It reveals that the constraints on rural reform could also be created by the conflicting ideas and practices of reform agencies and agents.

Western and Japanese involvement in sericulture trade and production connects this case study of modern Sichuan sericulture with the debate over imperialism in China. Marxist perspectives on Chinese history assert that imperialism was one of the important causes of the backwardness of modern China, but Philip C. Huang argues that the arrival of imperialism only accelerated the path the Chinese rural society had already taken. In the study of the Chinese silk industry, while Lillian M. Li considers that imperialism was benign to the Chinese silk industry, Robert Y. Eng suggests imperialism was Janus-faced.¹² Sericulture in Sichuan represents a case of foreign impact on an inland economy. Direct foreign influence in Sichuan was

¹² Lillian M. Li, *China's Silk Trade*; and Robert Y. Eng, *Economic Imperialism in China, Silk Production and Exports, 1861 – 1932* (Berkeley: University of California, Center for Chinese Studies, 1986).

generally weak. Foreign demand for raw silk helped secure the cash income of rural households, but rendered the remote region vulnerable to international economic fluctuations. The limited scale of direct foreign involvement did not disadvantage the Chinese producers, but introduced them to technological innovation.

Sericulture was tightly tied with the peasant economy. The peasants in Sichuan sericulture demonstrated the same rationality of the peasants in other part of China as described by Philip C. C. Huang and Lynda S. Bell. They were rational economic actors who measured the costs and benefits of their investments carefully. Their technological choice resulted from a confluence of socioeconomic, cultural, demographical, and ecological factors, and also became an essential part of the rural Chinese economy.

Fundamentally, this study of sericulture technological transformation in Sichuan contributes to not only these above-mentioned themes in modern Chinese history, but sheds light on the pluralistic paths and efforts taken to attempt to create a wealthy and strong China during the first half of the twentieth century. Various groups from divergent social, economic, political, and ideological backgrounds proposed and practiced different methods in the hope of improving quality and increasing output. There was no unified path in achieving this goal at the beginning. For improving sericulture technology, individual groups invested in, introduced, and adopted different technologies, which took the form of imported modern scientific knowledge, or indigenous techniques developed from traditional Chinese skills. The

paths were not narrowed down until the 1930s, when the provincial government of the Liu Xiang regime and later the Nationalist government pursued their interest in sericulture in Sichuan. They envisaged only one way of improving sericulture in Sichuan – the government supervised and controlled replacement of traditional skills by modern foreign sericulture techniques. The CCP government followed this strategy and finally realized it.

This trajectory of developing sericulture resembles China's modern experience of struggling to become a wealthy and strong state in the early twentieth century. The various approaches were narrowed down to reveal the one and only one way of creating a wealthy and strong China after 1949, through the socialist planned economy that completely expelled traditional values and idea.

Beyond the context of China, the evolution of sericulture in modern Sichuan echoes the transformation of underdeveloped countries through industrialization and agricultural modernization. First, traditional techniques were appropriate to the institutional, social, and economic conditions of the local society at the time. They could survive the intensive competition of foreign techniques. The displacement of traditional technology and techniques by foreign ones took place over a very slow process, rather than through disruptive substitution. Similarly, in India, despite economic competition, a variety of traditional handicraft productions found their ways of adjusting to commercialization to survive, and only became industrialized

gradually.¹³

Second, traditional production was the source of innovation. Sericulture in Japan for instance reveals binary approaches to development. Japanese society had generated a strong dynamic in inventing, research, and improving sericulture technology indigenously since the Tokugawa era. They embraced a set of techniques of improving sericulture that was distinct from the West. The technology was adapted to the social and economic system in contemporary Japan. The interest and approach in improving sericulture technologies during the Tokugawa era had long last effect on Japan's industrialization. Japan's success in industrialization was not only based on the indefatigable adoption of Western knowledge and technology, but also on a long lasting tradition of simultaneous research on the improvement of existing techniques.¹⁴

Modern technological development in the previously non-industrialized regions was not a simple process of borrowing and imitation from the West. Instead, the process ensued alongside the continued development of indigenous technology, which became another source of resistance to Westernization locally. During this process, the common producers experienced both deskilling through the obsolescence of their existing techniques, and re-skilling that endowed them with new types of knowledge to keep up with the changing world.

¹³ Tirthankar Roy, *Traditional Industry in the Economy of Colonial India*.

¹⁴ Tessa Morris-Suzuki, "Sericulture and the Origins of Japanese Industrialization", *Technology and Culture* 33, 1 (January 1992), pp. 101-121.

GLOSSARY

- Advanced Sericulture Educational Institute 高等蚕业讲习所 *Gaodeng canye jiangxisuo*
- Awakening of Insects 惊蛰 *Jingzhe*
- Baisha New Life Cotton Mill 白沙新运纺织厂 *Baisha xinyun fangzhechang*
- benevolent 仁 *ren*
- Cen chunxuan 岑春萱
- Chen Cuizhen 陈翠贞
- Chen Wanxi 陈宛溪
- Chen Yaozhang 陈瑶章
- Cheng Timing 程体明
- Chief of Military Rehabilitation 四川善后督办 *Sichuan shanhou duban*
- cocoon *hong* 茧行 *jianhang*
- cocoon purchasing station 茧庄 *jianzhuang*
- Committee for the Rehabilitation of Sichuan Silk 川丝整理委员会 *Chuansi zhengli weiyuanhui*
- copper cash 文 *wen*
- country of treasures 天府之国 *tianfu zhiguo*
- Cudrania triloba* 柘 *zhe*
- Dark Green Attired God 青衣神 *Qingyishen*
- Deng Yingchao 邓颖超
- domestic silk re-reeling 摇经 *yaojing*

domestic silk 土丝 *tusi*

Duan Youyun 段佑云

Fei Dasheng 费达生

Feng Guangguan 冯光灌

gailiangzhong 改良种 *improved silkworm variety*

Gao Xianjian 高显鉴

Ge Jingzhong 葛敬中

gong 恭 *respectful*

Great Han Sichuan Military Government 大汉四川军政府 *Dahan Sichuan junzhengfu*

Guangdong Silk Research Institute 广东省丝业研究所 *Guangdongsheng siye yanjiusuo*

hand-operated multiple-reel frame 人力连动制丝车 *renli liandong zhisi che*

He Lian 何廉 Franklin Ho

honest 信 *xin*

hu mulberry 湖桑

improved silk 改良丝 *gailiangsi*

improved silkworm 改良种 *gailiangzhong*

instruction stations 指导所 *zhidaosuo*

intelligent 敏 *min*

Intendant for the Encouragement of Enterprise 劝业道 *Quanyedao*

International Committee for the Improvement of Sericulture 中国合众蚕桑改良会

Zhongguo hezhong cansang gailianghui

iron machine 铁机 *tieji*

Jiang Shengjin 江生金

Jiang Tongqing 蒋同庆

Jiangsu-Zhejiang-Anhui Silk Producers' Guild 江浙皖丝茧总公会 *Jiangzhewan sijian*

zonggonghui

Jiangsu Provincial Girls' Sericulture School 江苏省女子蚕业学校 *Jiangsusheng nüzi*

canye xuexiao

Jiangsu Provincial School of Sericulture 江苏省立蚕丝专科学校 *Jiangsu shengli*

cansi zhuanke xuexiao

kind 惠 *hui*

large frame 大车 *dache*

Leizu 嫫祖

lenient 宽 *kuan*

Leshan Sericulture Experimental Area 乐山蚕丝实验区 *Leshan cansi shiyanqu*

Li Dequan 李德全

liang 两

Liu Qingyang 刘清扬

Liu Xiang 刘湘

lu mulberry 鲁桑

Lu Zuofu 卢作孚

Materials of literature and history 文史资料 *Wenshi ziliao*

Meng Qingshu 孟庆树

Miyasaka Kurō 宫坂九郎

National Central School of Technology 国立中央技艺专科学校 *Guoli zhongyang jiyi
zhuanke xuexiao*

National Supervising Team of Gazetteer Compiling 中国地方志指导小组 *Zhongguo
difangzhi zhidao xiaozu*

native silkworm 土种 *tuzhong*

New Life Women Handicrafts Society 新运妇女工艺社 *Xinyun funü gongyishe*

New Policy 新政 *Xinzheng*

Ning Zhicun 宁芷邨

Nongsang Jiyao 农桑辑要 Essentials of agriculture and sericulture

overcrowding population 人满 *renman*

Private Vocational Middle School 民立实业学堂 *Minli sheye xuetang*

Provincial Advanced Agricultural School 省立高等农业学校 *Shengli gaodeng nongye
xuexiao*

Provincial Nanchong High School of Sericulture 四川省立南充高级蚕丝科职业学校
Sichuan shengli nanchong gaoji cansike zhiye xuexiao

raw silk 生丝 *shengsi*

recover the loss 翻本 *fanben*

re-reeled domestic silk 摇经丝 *yaojingsi*

Sannongji 三农记 Records of three aspects of agriculture

Sericulture Goddess 蚕姑 *Cangu*

Sericulture Reform Base 蚕丝改良场 *Cansi gailiangchang*

Sheng Keqin 盛克勤

Sheng Zijiu 沈兹九

Shi Liang 史良

Shi Qingyang 石青阳

Shi Xie 施燮

Shinri Trading Company 新利洋行 *Shinri Yōkō*

Sichuan Provincial Agricultural School 四川通省农政学堂 *Sichuan tongsheng nongzheng xuetang*

Sichuan Provincial Government's Management Guidelines on the Silk Industry 四川省政府管理蚕丝业办法大纲 *Sichuansheng zhengfu guanli cansiye banfa dagang*

Sichuan Sericulture Society 四川蚕桑公社 *Sichuan cansang gongshe*

Sichuan Silk Corporation 四川丝业公司 *Sichuan siye gongsi*

small frame 小车 *xiaochē*

Songgai Textile Experimental Area 松溉纺织实验区 *Songgai fangzhi shiyanqu*

Sun Benzong 孙本忠

Suqi 苏稽

Temporary Regulation on the Centralized Purchase and Sale of Raw Silk 全国生丝统购统销暂行办法 *Quanguo shengsi tonggou tongxiao zhanxing banfa*

Three joint memorials for reform by the Huguang and Liangjiang Governor-Generals 江楚会奏三折 *Jiangchu huizhou sanzhe*

Three Sericulture Maidens 三娘 *Sanniang*

vernal equinox 春分 *chunfen*

Wang Tianyu 王天予

Wang Xingxian 王行先

wen 文

Wen Yousong 温友松

wooden frame 木车 *mu che*

Wu Yifang 吴贻芳

Xia Yingzhe 夏英喆

Xiliang 锡良

Xiong Jiguang 熊季光

Xu Kan 徐堪

You Shibo 游仕勃

Yu Qingtang 俞庆棠

Zeng Baosun 曾宝荪

Zhang Lan 张澜

Zhang Senkai 张森楷

Zhang Suwo 张素我

Zhang Weizhen 张维楨

Zhang Xiaomei 张肖梅

Zhao Erfeng 赵尔丰

Zhao Erxun 赵尔巽

Zhao Hongji 赵鸿基

Zhejiang Sericulture School 浙江蚕学馆 *Zhejiang canxueguan*

Zheng Kai 郑恺

Zheng Pijiang 郑辟疆

Zheng Yuxiu 郑毓秀

Zhou Jixian 周继先

Zhou Shanpei 周善培

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File no. 6 – 7 – 01364. Sichuan quanyedao zhachi Baxian ju Chongqing siye baoshang gongsuo bingqing zhuojian gongfei chi huitong zhenzhuo banli bing chao chengdu siye gongsuo zhangcheng dengqing juan 四川劝业道札饬巴县据重庆丝业保商公所稟请酌减公费饬会同斟酌办理并抄成都丝业公所章程等情卷 (Replying the appeal of reducing cost from the Chongqing Silk Guild, the Intendant for the Encouragement of Enterprise requires all related entities to discuss the issue jointly, and sends a copy of the memorandum of Chengdu Silk Guild for their reference), May – November 1910.

File no. 6 – 54 – 01341. Sichuan jingzheng zongju quanyedao zhafa Baxian “chuansi chukou mianli zhangcheng ji gailiang chuansi chukou dijie zhangcheng”, bing chi zunzhang banli juan 四川经征总局劝业道札发巴县 “川丝出口免厘章程及改良川丝出口抵借章程” 并饬遵章办理卷 (The Intendant for the Encouragement of Enterprise implements the regulation of exempting lijin on the export of improved raw silk and the regulation of pledging improved raw Silk to export, and requires subordinates to carry on according to the regulations), March – May 1910.

File no. 6 – 54 – 01348. Sichuan tongsheng quanyedao zhachi Chongqing siye baoshang fensuo chengyan guang'an mingguanghe sichang gailiang chukou xinsi mianshui bingfu dengqing juan 四川通省劝业道札饬重庆丝业保商分所呈验广安明广合丝厂改良出口新丝免税稟覆等情卷 (The Intendant for the Encouragement of Enterprise requires the Chongqing Silk Guild to examine the qualification of the improved raw silk exported by the Mingguanghe silk workshop in Guang'an, for the purpose of lijin exemption), November – December 1910.

File no. 6 – 54 – 01353. Sichuan quanyedao zhafa Baxian "Sichuan buzhengsi quanyedao huitong zengting geshu quanye fensuo chaoyan gailiang chupin xisi guize ji huiding yansiweiyuan guize" 四川劝业道札发巴县“四川布政司劝业道会同增厅各属劝业分所查验改良出品细丝规则及会订验丝委员规则” (The Intendant for the Encouragement of Enterprise implements regulations of criterion of improved silk examination and silk examiner selection), May, 1911.

File no. 6 – 54 – 01358. Sichuan quanyedao xiangding gailiang chuansi chukou dije zhangcheng 四川劝业道详订改良川丝出口抵借章程 (The Intendant for the Encouragement of Enterprise details the regulation of pledging improved raw silk to export), Xuantong reign (1909 – 1911).

File no. 6 – 54 – 01373. Sichuan quanyedao zha Chongqing siye baoshang gongsuo jieyun you Yichang yun Leshan zhi jiqi qingxingwen 四川劝业道札重庆丝业保商公所接运由宜昌运乐山之机器情形文 (Letter of the Intendant for the Encouragement of Enterprise to the Chongqing Silk Guild on the issue of

transporting machines from Yichang to Leshan), July 1910.

File no. 6 – 54 – 01374. Sichuan quanyedao zha Chongqing quanye fensuo tongchuan yongjingxiang sichang chuoye you yushang Zhao Zisheng deng jigu chengban juan 四川劝业道札重庆劝业分所潼川永靖祥丝厂辍业由渝商赵资生等集股承办卷 (Letter of the Intendant for the Encouragement of Enterprise to the Chongqing sub-bureau for encouragement of enterprise, on the issue that the Yongjingxiang Reeling Factory in Tongchuan was taken over by Chongqing merchants Zhao Zisheng and others), January – October 1909.

File no. 6 – 54 – 01555. Chuandu tongchi gedi sihou fanyou wei zhongsang suoja dianzu deng kongzheng zhi'an defangguan jie zhaozhang xunduan yibao zhongzhi zhili er du diaonan zhiduan 川督通饬各地嗣后凡有为种桑索加佃租等控争之案地方官皆照章讯断以保种植之利而杜刁难之端 (The Sichuan Governor-General requires the local magistrates to follow the rules to settle the lawsuits on increasing rental of mulberry plantations, for safeguarding the interest of and forestalling harassments on agricultural production), January – February 1909.

File no. 6 – 54 – 01557. Liuri biyesheng Peng Zuxian deng hezi sheli yichuanyushuxi cansangshe liju zhangcheng kenqing li'an dengqing juan 留日毕业生彭祖贤等合资设立衣川裕蜀西蚕桑社拟具章程恳请立案等情卷 (Peng Zuxian and other returned students from Japan set up joint venture the Yichuanyushuxi Sericulture Society, and submits memorandum to apply for registration and acknowledgement), December 1909 – November 1910.

File no. 6 – 54 – 01559. Pengjiachang dexin cansangshe shezhang Jiang Yuting deng pingcheng zhangcheng kenqing li'an juan 彭家场德新蚕桑社社长江玉廷等禀呈章程恳请立案卷 (The president of the Dexin Sericulture Society Jiang Yuting submits memorandum to apply for registration and acknowledgement), May 1910.

File no. 6 – 54 – 01560. Bixianfuhua cansangshe jianzhang juan 璧贤阜华蚕桑社简章卷 (Memorandum of the Bixianfuhua Sericulture Society), 1910.

File no. 6 – 54 – 01561. Baxian Nanchengping guanli cansang chuanxisuo banli qingxing juan 巴县南城坪官立蚕桑传习所办理情形卷 (Materials on the situation of the public sericulture promotion center in Nanchengping, Baxian), October 1909 – September 1911.

File no. 6 – 54 – 01562. Baxian zunzhao sheng quanyedao zhachi xuansong miaoseng fusheng xuexi cansang juan 巴县遵照省劝业道札饬选送庙僧赴省学习蚕桑卷 (Following the requirement from the Intendant for the Encouragement of Enterprise, Baxian selects and sends Buddhist monks to Chengdu to study sericulture), February 1910 – September 1911.

File no. 6 – 54 – 01566. Baxian Xichengli ge siyuan jizi chengli cansangshe qing quanyedao li'an chushi baohu 巴县西城里各寺院集资成立蚕桑社请劝业道立案出示保护 (Monasteries in Xichengli, Baxian, pooled to set up sericulture society and apply government for acknowledgement and protection), July – August 1911.

Leshanshi Dang'an'guan 乐山市档案馆 The Archives of Leshan

File no. 6 – 2 – 159. Minguo Leshan xian shanghui, Sichuan diwuqu zhuan yuan gongshu, Leshan xianzhengfu, youguan wuzi jingzai he shougou yan, la, zhuan cha, yangmao, caiyou deng de daidian, cheng, xunling, zhiling, huidan, biao 民国乐山县商会、四川省第五区专员公署、乐山县政府有关物资竞赛和收购盐、蜡、砖茶、羊毛、菜油等的代电、呈、训令、指令、回单、表 (Items related to the Chamber of Commerce of Leshan County, the Fifth Special Administrative Inspectorate, and the Leshan county government, on the issues of products contests, and purchase of salt, white wax, brick tea, fleece, and rapeseed oil), February – December 1943.

File no. 6 – 1 – 193. Minguo Leshan xianzhengfu guanyu chuannan cansi jianshe gongsi yewu baogao, caichan qingce, gudong mingce, shouju, zhongyang yizhuanxiao yueshu 民国乐山县政府关于川南蚕丝建设公司业务报告、财产清册、股东名册、收据、中央艺专校约书 (Materials from the Leshan county government on the Chuannan Raw Silk Reconstruction Co., Ltd., including the business report, inventory of property, stockholder's list, receipts, and contracts with staff in the National Central School of Technology), 1947 – 1949.

File no. 6 – 1 – 270. Minguo Leshan xianzhengfu guanyu nonglin cansi wenjian youguan banxiao peiyang rencai, goujian zongzhuang, canzhong tiaoli 民国乐山县政府关于农林蚕丝文件有关办校培养人材、购茧总状、蚕种条例 (Materials from Leshan county government on the agricultural, forestation, and sericulture, including training specialists by setting up schools, cocoon purchase

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APPENDIX

Major sericulture counties of Sichuan identified by Ying Liangying in the Republic era¹

Three leading regions

1. Southern Sichuan

Leshan 乐山, Qingshen 青神, Jingyan 井研, Jiajiang 夹江, Qianwei 犍为, Meishan 眉山, Emei 峨眉, Hongya 洪雅, Danleng 丹棱

2. Northern Sichuan

Nanchong 南充, Xichong 西充, Nanbu 南部, Yanting 盐亭, Shehong 射洪, Santai 三台, Zhongjiang 中江, Mianyang 绵阳, Zitong 梓潼, Jian'ge 剑阁, Langzhong 阆中, Yilong 仪陇, Bazhong 巴中, Yingshan 营山, Peng'an 蓬安, Yuechi 岳池

3. Eastern Sichuan

Baxian 巴县, Jiangbei 江北, Hechuan 合川, Tongliang 铜梁, Dazu 大足, Tongnan 潼南, Anyue 安岳, Yongchuan 永川, Jiangjin 江津, Qijiang 綦江

Two minor regions

1. Far southern Sichuan

Yibin 宜宾, Junlian 筠连, Gaoxian 高县, Gongxian 珙县, Changning 长宁, Xingwen 兴文, Qingfu 庆符²

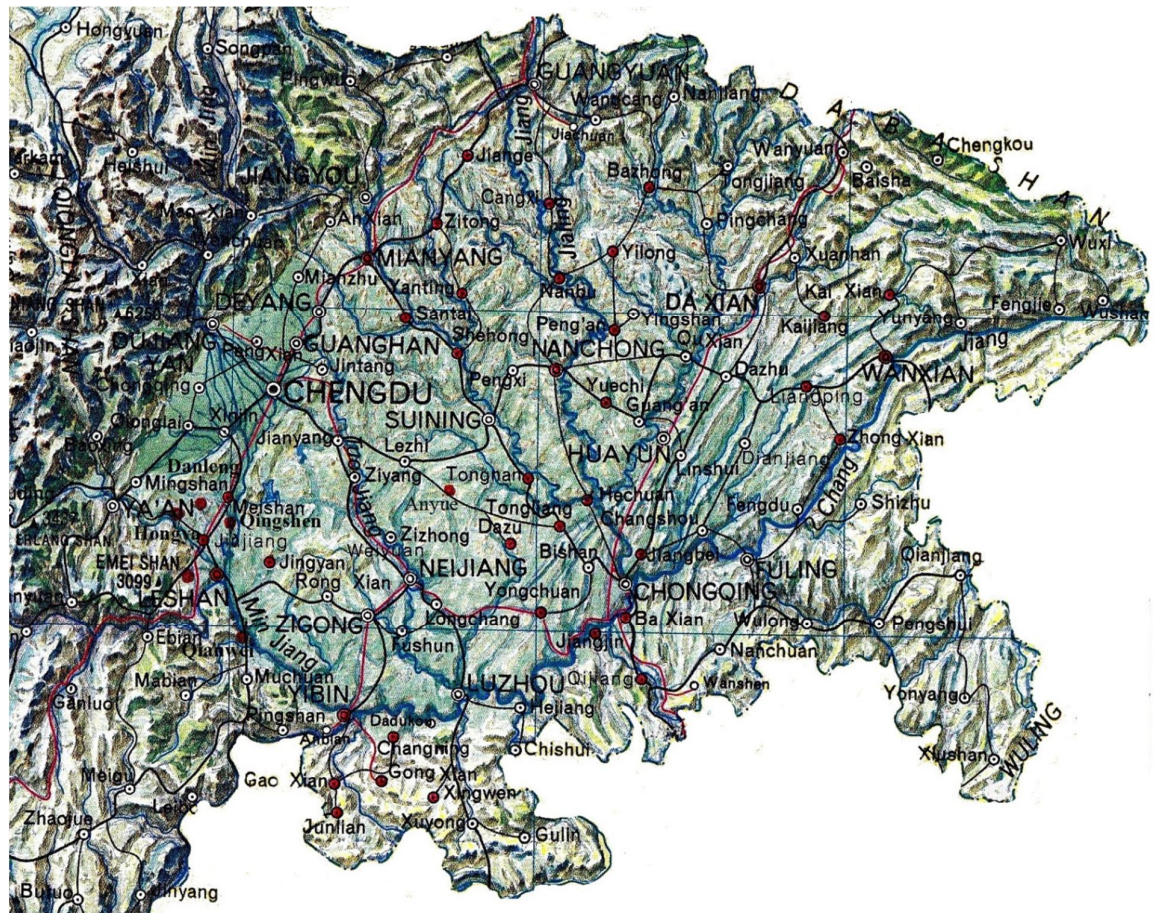
2. Far eastern Sichuan

Wanxian 万县, Kaijiang 开江, Kaixian 开县, Liangshan 梁山, Daxian 达县, Zhongxian 忠县

¹ Yin Liangying, *Sichuan canye gaijinshi*, p. 25

² Qingfu county merged into Gaoxian county in 1960.

MAP Topographical map and sericulture counties of the Sichuan Basin



This map is based on Chiao-min Hsieh and Jean Kan Hsieh, *China, a Provincial Atlas*, (New York: Macmillan Publishing Co., 1995), p. 126.

Major sericulture counties in the Republican China are highlighted as red dots in the map.