THE UNITED NATIONS UNIVERSITY UNIVERSITÉ DES NATIONS UNIES

Project on Technology Transfer, Transformation, and Development: The Japanese Experience

Projet sur l'expérience japonaise en matière de transfert, transformation et développement de la technologie

Distribution: Limited

HSDP-JE Series

This working paper was prepared within the framework and as part of the Project on Technology Transfer, Transformation, and Development: The Japanese Experience (JE) of the United Nations University's Human and Social Development Programme. The views expressed in the paper are those of the author and not necessarily those of the United Nations University.

The JE project is co-ordinated by UNU Project Co-ordinator Dr. Takeshi Hayashi, with the support of the Institute of Developing Economies, Address: UNU Project on Technology Transfer, Transformation, and Development: The Japanese Experience, c/o Institute of Developing Economies, 42 Ichigaya-Honmuracho, Shinjuku-ku, Tokyo 162, Japan. Tel: (03) 353-7501. Cable: AJIKEN TOKYO.

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Printed in Japan

ISBN 92-808-0225-9
ISSN 0379-5780

HSDRJE-47/UNUP-225

THE TRANSFER OF COAL-MINING TECHNOLOGY FROM JAPAN TO MANCHURIA AND MANPOWER PROBLEMS – FOCUSING ON THE DEVELOPMENT OF THE FUSHUN COAL MINES

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This paper is being circulated in a pre-publication form to elicit comments from readers and generate dialogue on the subject at this stage of the research.

I. THE OBJECTIVE AND RESEARCH APPROACH

Two papers, namely "Technology and Labour in Japanese Coal Mining" and a paper by Yutaka Kasuga,[1] have already examined the manner in which Japanese coal mining was transformed through the transfer of Western coal-mining machinery and coal extraction technology at the time capitalism was being established in Japan. Taking this research into consideration, the primary objective of this paper is to examine the manner in which Japanese coal mining developed its colonial operations in Manchuria at the time of the Japanese capitalistic invasion of China. To put the primary theme more concretely, the first aim is to clarify the process by which the accumulated technology of Japanese coal mining was transferred to China and then transformed under alien conditions, thus creating a unique technology of its own. An analysis of this process, moreover, clarifies the type of influence which the colonial management had upon the development of Chinese coal mining.

The second aim is to examine the manner in which Chinese labour was procured and managed in order for Japan to develop and manage modern coal mines in China. Unfortunately, since the middle of the nineteenth century, the development of capitalism in China had been suppressed by capitalistic powers. Because of China's insufficiently developed capitalism, as well as its free labour market, Japanese colonial coal mines lacked a modern labour force. The coal here lies in a clarification of the training given to the labour force (which was predominantly pre-modern) to make it modern.

The objective of this paper will be dealt with as follows: First, prior to an analysis of Japanese colonial coal mine management, an outline of the modernization process of Chinese coal mining will be studied.

Attention will be paid to the developmental standard of the endogenous Chinese coal-mining industry, as was done previously in an analysis of Japanese coal mining. Second, the developmental process of a modern colonial coal mine controlled by Japan will be examined. For this purpose, the Fushun Coal Mine, since it was not only a representative modern coal mine in China but also a typical colonial coal mine, will be studied. This mine will be the only one studied here because of space limitations. The developmental process pertaining to the technological aspects of Fushun Coal Mine will be examined first, and subsequently, those aspects pertaining to labour procurement and management will be explored.

This paper mainly analyses the management history of a Japanese colonial coal mine. The issue, however, strictly lies in the manner in which modern technology was transferred from an advanced nation to a lesser-developed nation and in a clarification of the problems which were induced at the time. This paper, therefore, is in no way intended either to justify Japanese colonial coal mine management or to dismiss it as having been inevitable. On the contrary, it is this writer's grave reflection that the Japanese military and economic invasion of China was nothing other than a societal crime committed by Japan. Based upon this reflection and the aforementioned issue of technology transfer a historical experience of Japanese colonial coal mine management in China will be analysed with the hope that this analysis will, in some way, contribute to the project under the theme of "Human and Social Development."

II. THE MODERNIZATION PROCESS OF COAL MINING IN CHINA

1. The Developmental Standard of Endogenous Coal Mining in China

Coal deposits in China, according to a 1913 survey conducted by an American geologist, N.F. Drake, were 996.6 million tons. A Chinese geologist, Hau De-feng, theorized in 1935 that the deposits were 230,000 million tons.[2] H. Bauer has pointed out that Drake's evaluation is closer to the truth.[3] As is the case with Chinese culture, the history of coal extraction in China is remarkably long.[4]

In China, coal was already used for fuel during the Han Period (206 B.C.-220 A.D.). Coal was extracted on an extensive scale from the tenth century to the thirteenth century during the Sung Period, because it was used not only for daily fuel but also as fuel for iron manufacturing and porcelain making. Moreover, the commercialization of coal progressed, and it is said that coal shops were opened at various places. In the Book of Marco Polo written at the end of the thirteenth century, the author stated as follows:

> Black stones are found throughout this country in the form of immense deposits. Although they burn like charcoal, their fire lasts much longer than that of charcoal and they are, moreover, inexpensive.[5]

The above account aptly shows that coal was extracted extensively and used widely in China.

Upon entering the Ming Period in the fourteenth century, coal extraction technology was accumulated and large-scale coal extraction was pursued by the coal industry with the use of hired labour. Tiangong Kaiwu, which was written in 1637, is a classic work regarding the history of

endogenous technology. It includes a noteworthy description pertaining to coal usage and methods of coal extraction.[6] According to Tiangong Kaiwu, the following were the ways in which coal could be used: use lump coal as it was, make chipped coal into bars by adding water and soil, coke the bars and use coke for fuel, and use coke bars made from powdered coal. Furthermore, a method to increase burning velocity by using bellows had already been invented. Other than using coal for cooking, coke, in particular, was used for iron manufacturing, copper melting, salt making, and porcelain making. The fact that the fuel used for iron making consisted of 30 per cent charcoal and 70 per cent coal deserves attention. As can be seen from the above, coal was already widely used; this is an indication of the marked development of the coal industry.

With regard to extraction methods, there was not only the excavation of galleries following the digging of an outcrop but also the excavation of pits. The pits were as deep as 15 metres. As a means of gas removal, a long bamboo pole was inserted into the pits and the poisonous gases were thereby taken off. Coal was extracted at coal faces which were located at both the left and right sides of the main gallery, and pillars were used to create a chamber. To prevent cave-ins, both pillars and boards were used in the chamber and were supplemented with dirt and sand. A simple hoist was used for coal transport in the pits. It can thus be seen that there was a certain accumulation of coal extraction technology by the middle of the seventeenth century.

Upon the founding of the Ch'ing Dynasty at the end of the seventeenth century, however, coal mining does not appear to have made much progress. This was due to the policy of the Ch'ing, which cherished nature so much that it generally kept strict control over mine excavations. Nevertheless, civilian mine management was approved at the end of the eighteenth century, and the coal-mining industry seems to have revived.[7] For example, a record exists revealing that a manufacture-type coal mine was managed by hiring a massive number of agrarian fugititives at Mentougou in Hebei Province in the eighteenth century. In addition, it is ascertained that Shansi merchants favoured coal sales.[8] Thus, coal mining in China is considered to have attained a certain developmental standard by the

middle of the nineteenth century when Chinese ports were opened.

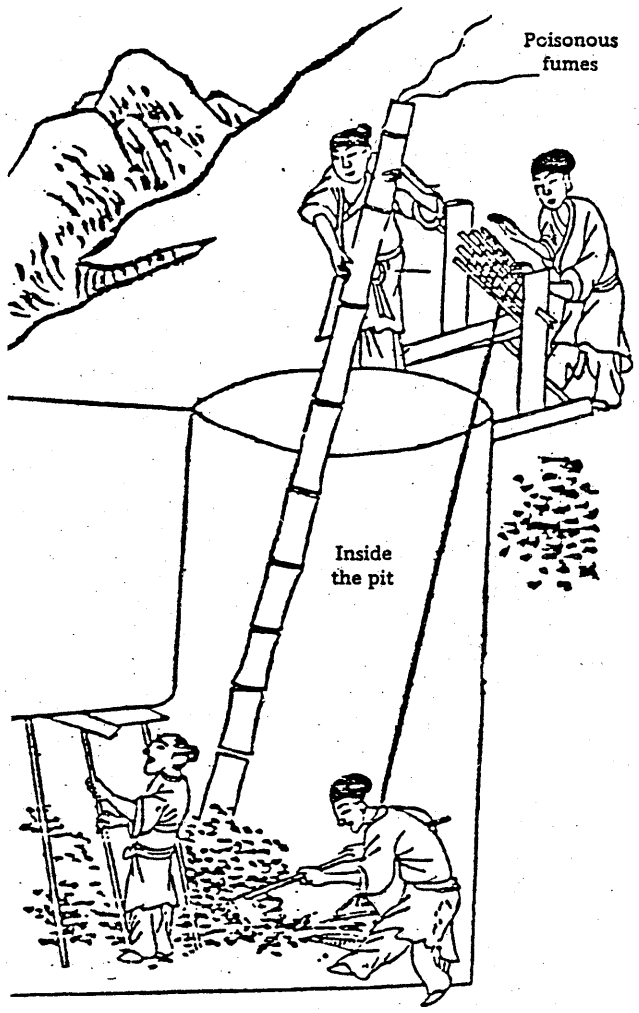

FIG. 1. View of a Coal-Mining Pit in about the Seventeenth Century (from Tiangong Kaiwu [Discernment of technology])

Immediate data which would reveal the developmental standard of Chinese endogenous coal mining at the end of the nineteenth century are lacking. Considering the long history of Chinese coal mining, however, it is probable that the developmental standard from the middle to the end of that century was at least equivalent to that of Japanese endogenous coal mining. This can be seen from the following evidence.

First, because of the arrival of foreign steamships and the establishment of Western-style arsenals, the demand for coal increased and large-scale development of endogenous coal mines ensued. Second, the above assumption is evident in that the technological standard of endogenous coal mining grew simultaneously with the development of modern coal mining upon entering the twentieth century. Regarding the first point, in 1880, Li Hung-chang, a high-ranking official of the Ch'ing Dynasty, excavated a large-scale endogenous coal mine in the Cezhuan region of Dongshan Province which later became one of the mining districts of the Zhongxing Mine. He managed it for 15 years as part of an attempt to modernize China. Although this mine came was closed due to flood damage and lack of capital, it is revealed that coal was extracted on a fairly large-scale basis relying upon endogenous technology.[9] In 1901, two large-scale endogenous coal mines were excavated by the local leaders of Fushien, Fengtian Province. Wang Cheng-yao gathered a group of shareholders who invested 100,000 Lia to establish Hua Gongli Company, and five pits were opened on the basis of endogenous technology. Weng Shou and Yan Zhiyao invested 22,000 Lia, and organized Fushun Meikuan Company, which opened mines "relying strictly upon the primitive Chinese methods of coal extraction."[10] Later, small steam engines were installed at those endogenous coal mines. Such developments as seen in these coal mines at the end of the nineteenth century also were seen at such mines as Zhongyuan Gongsi, Jingxing, Liuhegou, Yili, and Zhengfeng.[11]

Although the developmental standard of endogenous coal mining is not clear, it can be surmised from the actual conditions in these mines at the beginning of the twentieth century. Based upon several research reports on endogenous-type coal mines in China in the 1910s,[12] the technological standard of the endogenous-type coal mine was as follows: When a mine was opened naturally there were pits, inclined shafts, and adits. The portal of a pit was between one to two metres in diameter. While small pits were 10 to 20 metres deep, large pits were 30 to 50 metres deep. The portal of an inclined shaft was generally terraced with a base of one metre, a ceiling of 1.5 metres, and a height of 1.5 metres. The depth of small inclined shafts ranged from 15 to 30 metres, while large ones were from 60 to 100 meters deep. Due to the advanta-

geous drainage of the adits, small adits were 120 to 150 metres deep; there also were large adits about 150 metres deep. Adits were dug quite extensively provided there was good ventilation. Furthermore, in the case of a small pit, the pit itself also was used for coal transport, drainage, ventilation, and lifting of workers. In the case of large pits, however, separate pits were excavated for each purpose.

The pits were restricted in size mainly due to the problem of spring water. With regard to drainage methods, adit water was drained naturally while a special device was made to drain water from pits and inclined shafts. As for pits, a pulley carried sump water from the bottom to the surface. The pulley, when operated manually, required from two to 10 workers. When horses were used, two to eight horses were put to work, and the maximum drainage capacity was approximately 60 tons per pulley a day. Some inclined shafts were equipped with a drainage pit, which was worked by a pulley. Others, however, relied upon a drainage method which operated by terrace. By this method, terraced sumps were created every two to three metres. Workers carried the water at the bottom to a sump on the next terrace it was in turn carried to one higher up and so on. Depending upon the structure of the pits or inclined shafts, a sump was created at the coal face and drainage workers carried the water to another sump at a higher level. When a level existed, a ditch was dug for natural drainage, and when conditions were more favourable, a drainage portal was excavated for natural drainage.

The extraction method at small and low-standard mines was that of "badger burrowing" around the portal. Average- or high-standard medium to large mines relied more or less upon the pillar system of extraction. An inclined shaft or a level which acted as the main gallery was dug from the bottom of the pit. Levels were dug along both sides of the main gallery and coal was extracted at this site, leaving coal pillars with a width of about five to 10 metres. Although the coal pillars were usually square, it seems as if there also were triangular and pentagonal pillars.

The main gallery was extended in accordance with the size and the con-

ditions of the mine, and the coal face became situated farther and farther away from the portal. When drainage and ventilation problems made extraction too difficult, the gallery was abandoned by the miners, who pulled down the coal pillars as they retreated. A gallery usually was operated from one to three years, and at best for about three to five years. As for the mine prop, the frame was supported by pit wood and the extracted site was sometimes filled with dirt and stones. Natural ventilation was secured mainly from an old pit which was dug through to connect to the new one. There were, however, cases when the pit was ventilated manually by using a windmill or making a draft hole. There also were cases when ventilation was improved by burning a fire in the pit. What is noteworthy with regard to lighting is the fact that not only oil, but also fumeless torches made of decayed wood and wood wax, were used. Coal was transported manually in the pit but was hoisted by a pulley to the portal.

The capacity per mine (based upon the simple calculation that there were approximately 300 work days a year) for small mines was a daily output of about five tons and thus an annual output of about 1,500 tons. In large mines, about 40 to 70 tons were produced daily for an annual output of 10,000 to 20,000 tons. In view of the fact that the productivity per worker per day is estimated to have been anywhere from 200 to 500 kilograms, an annual output of 1,500 tons must have required 10 to 25 workers. Likewise, a daily output of 40 to 70 tons would have necessitated 80 to 350 workers.

It is pertinent here to explore the extent to which coal was produced and the background of the coal market for the endogenous coal industry at the end of the nineteenth century. Although there is no record to clarify this point, it is estimated that the output was between one million to three million tons. These figures are arrived at in view of the fact that the nation-wide coal output by the endogenous-type coal mines around 1912 is estimated to have been 3.8 million tons according to one theory and 6.7 million tons according to another theory.[13] As far as output is concerned, the Chinese industry's output appears to have been far greater than that of Japan's at the end of the Tokugawa Period.

Although the standard of extraction technology in general is considered to have been the same as that in Japan at the end of the Tokugawa Period, it appears as if the standard maintained by large mines was higher than that found in Japan.[14]

As seen above, the standard of the endogenous coal industry in China at the end of the nineteenth century was at least equivalent to the developmental standard of endogenous Japanese coal mining. It is presumed that the accumulated mining technology on the part of the endogenous coal-mining industry and the bearers of endogenous technology, such as the coal extraction dealers, foremen, and skilled miners, contributed by creating the basis for the modernization of Chinese coal mining as was the case in Japan. In other words, it is presumed that they co-operated in the introduction of Western coal-mining machinery and advanced coal extraction technology. They were quick to transform themselves as the bearers of advanced technology and supported the modernization of Chinese coal mining from the bottom.

2. The Modernization Process of Coal Mining in China

The developmental process of modern coal mining in China until the end of World War II can be broadly divided into three stages. The first was the period from the 1870s to 1911, when the modernization of Chinese coal mining began and when modern coal mining emerged. The second was the period from 1912, when the Republic of China was established, to 1931, when the Manchurian Incident broke out. This period coincided with an economic boom brought by World War I, and it also was the period when the modernized coal-mining industry was being established. The third period began with the Manchurian Incident and ended in 1945, when Japan was defeated. During this period the Japanese military invasion into China was extended and the Chinese coal-mining industry became impoverished.

Generalized characteristics pertaining to the developmental process of modern coal mining in China can be summarized in four points. First,

the modernization of Chinese coal mining was carried out under the leadership of foreign capital belonging to the great powers. Second, although certain modernization attempts were pursued with native capital in China, it was not possible to achieve sufficient results because of both limited capital and technology. Third, the development of capitalism in China stagnated due to the control of the foreign powers. Thus, modern coal mining in China as a whole was not developed sufficiently and relied extensively upon pre-modern endogenous-type coal mining. Fourth, despite the above circumstances, two large colonial coal mines, the Fushun Coal Mine run by the Japanese and the Kailuang Coal Mine operated by the British, showed special development. They thus attained a monopolistic status and caused the Chinese coal-mining industry to become colonial and imbalanced. The following is an outline[15] of the developmental process of modern coal mining in China.

The First Stage: The Emergence of Modern Coal Mining in China

The modernization of coal mining in China was begun in the 1870s with the purpose of supplying coal both to foreign steamships which began to come to China in the 1850s and to modern factories and railways which began to be established in China. As shown in Table I, coal mines which later became major ones in China were developed in succession. The characteristics of the development process in the first stage were as follows: First, in view of the fact that the foreign powers had established control over large parts of China, the mines were developed with foreign leadership and capital. In addition, the rights to develop the coal mines had been given to foreign investors. Second, the introduction of foreign capital was unavoidable due to the limitations faced by endogenous coal mining in terms of drainage, ventilation, and coal transport. In addition, the independent development of modern coal mines by the Chinese was not possible because of a lack of capital, thus making foreign capital a necessity. Third, the development of modern coal mines by Chinese native capital showed insufficient progress due to inadequate funds and a weak protective and promotion policy set forth by the Ch'ing Dynasty. Consequently, it can be pointed out that the basic structure of

TABLE 1. A Chronological Table of Modern Coal Mining Development in China

Year	Name of coal mine	Location	Note
1878	Kaiping Coal Mine	Hebei Province	Developed by Li Hung-Chang, who invested 1.2 million lia and introduced western machinery and British engineers.
1897	Fu Co. (Beijing Syndicate)	Shansi Province	Developed by an Italian using British capital (10 million lia).
1897	Lincheng Coal Mining Co.	Hebei Province	Developed by the state using Belgian capital.
1898	Huaxiang Coal Mine	Chiangsi Province	Developed first with Chinese capital and later with Japanese capital, which was invested in 1913.
1898	Jiawang Coal Mining Co.	Chiangsi Province	Developed by the Chinese at the cost of two million yuan.
1898	Mentougou Promotion Co.	Hebei Province	Developed by the Americans at the cost of 60 million yuan.
1902	Jingxing Mining Co.	Hebei Province	Developed by the Germans as a Chinese-German joint venture.
1902	Zhongxing Coal Mining Co.	Shantung Province	Developed first with German capital; later became independent with native capital.
1902	Yugan Coal Mine	Chiangsi Province	Developed by the state.
1903	Fushun Coal Mine	Fengtian Province	Developed with Russian capital.
1904	Liuhegou Coal Mining Co.	Henan Province	Developed by the state prior to the establishment of this company.
1906	Baojin Co.	Shansi Province	Developed by powerful citizens and merchants of Shansi to compete against Fu Co., which was later bought up.
1907	Kailuang Coal Mine	Hebei Province	Developed by Yuan Shih-k'ai to compete against Kaiping Coal Mine, which was later merged.
1907	Jimingshan Coal Mine	Harbin Province	Developed by Chinese capital of 470,000 yuan.
1907	Siwan State Coal Mine	Kuansi Province	State-developed and state-run with an investment of 500,000 lia.
1908	Yili Coal Mining Co.	Hebei Province	Developed by powerful citizens and merchants at a cost of 20,000 yuan.
1910	Huafeng Coal Mining Co.	Shantung Province	Developed by the Chinese at a cost of 30,000 lia.

Note: Formulated from related references.

Chinese coal mining was formulated primarily in the first stage.

The first attempt at modernizing China's coal mines was pursued by the Chinese themselves. A high-ranking officer of the Ch'ing Dynasty, Li Hung-chang, who was then the governor of Zhili Province (later Hebei Province) established a steamer company in 1875. He did so not only as a means of alleviating China's financial difficulties but also with the intention of promoting Chinese modernization. Moreover, in 1878 Li invested 1.2 million Lia to open the Kaiping Coal Mine at Tangshan in the same province to be able to supply coal to the steamers.[16] He employed two British engineers, imported coal-mining machinery, and opened a Western-style coal mine. The Kaiping Coal Mine excavated a new pit at Linsi in 1892 and modernized its extraction, selection, and transport, which formed the basis for the later Kailuang Coal Mine. Kaiping Coal Mine, however, suffered from insufficient capital and had to bring in foreign capital by gathering £200,000 worth of foreign bonds in London in 1899. During the Boxer Rebellion, which occurred in 1900, England invested £1 million and established the Chinese Engineering and Mining Co., Ltd. This company bought up Kaiping Coal Mine in the following year and colonized it.

As symbolically shown by this case, although begun by the Chinese themselves the modernization of coal mining in China had to immediately rely upon foreign capital. This was the complete opposite of coal-mining modernization in Japan, where it was self-sufficiently developed according to the policies of the Meiji Restoration government, which pursued the total elimination of foreign capital while providing maximum protection. In the 1870s, when modernization attempts in China were first carried out, the Ch'ing Dynasty accepted the economic invasion of the Western powers into China through such treaties as the Nanking Treaty of 1842, the Tienchin Treaty of 1858, and the Beijing Treaty of 1860. Thus the installation of railways and telegraphs, and the management of factories and mines by foreign capital, also were approved.[17] There is no space here to discuss why China was unable to prevent a foreign economic invasion as was the case with Japan. It should at least be confirmed, however, that the corrupt Ch'ing Dynasty collaborated with

the foreign powers and allowed an economic invasion to take place. Moreover, despite the fact that there was a strong and extensive anti-colonial movement in China, the dynasty suppressed this movement.[18]

The Chinese themselves continued to develop modern coal mines independently even though coal mine management by powerful foreign capital was allowed.[19] Most of the attempts, however, failed. For example, under the leadership of Yuan Shih-k'ai, Luangzhou Mining Company was established near Kaiping Coal Mine in 1906 to offset the colonization of Kaiping Coal Mine. Luangzhou Coal Mine, however, suffered from a lack of capital and lost in the competition against Kaiping Coal Mine, which controlled the railways. Thus, in 1912, Luangzhou Coal Mine was absorbed by Kaiping Coal Mine.[20] Jingxing Coal Mine in Hebei Province also was first developed by the local people in 1895 as an endogenous-type coal mine. After insufficient capital halted its development, the modern coal mine was completed 1902 with German capital. Yuan Shih-k'ai, however, fearing the loss of this concession, had the provincial government buy up the mining district in 1906. Nevertheless, the mine had to be ultimately managed as a joint venture with the Germans because of insufficient capital.[21]

Local leaders of Fushun, Fengtian Province, excavated an endogenous-type mine in 1901 and it was gradually modernized. As a result of the Kassiny Treaty, Russia obtained mining and railway installation concessions and came southward to Manchuria. Fushun Coal Mine thus came to be controlled by the Russians and was modernized with Russian capital.[22] With the Russo-Japanese War this mine came under the control of the Japanese military and was thereafter developed by Japan.

Germany, which obtained railway and mining concessions in Shangtung Province, modernized Huaxiang Coal Mine in Chiangsi Province as well as Fangzi Coal Mine in Shangtung Province in 1898.[23] After obtaining Kaiping Coal Mine, England established the Fu Company (the so-called Beijing Syndicate) in Henan Province in 1898, and invested ₤1,240,000 to develop it into a modern coal mine.[24]

Nevertheless, it is not as if all of the independent modernization attempts made by native capital resulted in failure. Zhongxing Coal Mine in Shangtung Province, for example, was opened by Li Hung-chang in 1880 and managed by him for 15 years. He failed in an attempt to introduce German capital in 1906. In 1911 he gathered 1.5 million Lia of native capital to modernize the mine.[25] Subsequently, this coal mine became the largest one financed by native capital. The same was true with such coal mines as those of Baojin Company in Shansi Province, Huafeng Coal Mining Company in Shangtung Province, Yili Coal Mining Company in Hebei Province, and Jiawang Coal Mining Company in Chiangsa Province.[26] Moreover, upon entering the twentieth century, many endogenous-type coal mines were excavated throughout the country, and a number of these were gradually modernized by native capital after the establishment of the Republic.[27]

At present, the actual conditions pertaining to the first stage of Chinese coal mining are hardly clear. For instance, the output is unknown. In view of the fact that the 1912 output was already in the vicinity of 13 million tons, it would not be an exaggeration to estimate that there was an annual coal output of several million tons at the beginning of the twentieth century. Furthermore, judging from the circumstances regarding the establishment of modern coal mines, the greater portion of the output can be regarded as having been produced by modern coal mines. Consequently, a labour market for coal mine workers was formulated and the endogenous coal-mining industry contained its own endogenous engineers and skilled miners. The development of modern coal mines was carried out under the leadership of foreign engineers and skilled miners from the advanced nations. As pointed out earlier, however, this modernization was actualized due to the co-operation of the endogenous engineers and skilled miners. If it had not been for this group, the modernization of coal mining in China would have been delayed further, in fact, it would have stagnated. Moreover, endogenous engineers and skilled miners were being trained gradually as a modern labour force in the process of being mobilized for work in the modern coal mines. A new Chinese labour force also was recruited and trained for the development of modern coal mines, and managers opened mining

schools to train engineers.[28] Incidentally, the "Mining Regulations" of the Mining Act enacted in 1902 stipulated in its ninth chapter that "A mining school should be established near the mine in order to reserve future personnel."[29] Thus modern Chinese engineers and a labour force gradually came into being and the labour market for modern coal mining was formulated.

The Second Stage: The Establishment of Modern Coal Mining in China

The actual conditions of Chinese coal mining in this stage are somewhat clearer.[30] As shown in Table 2, the output grew steadily, reaching 13 million tons in 1912. In 1921 it was increased approximately 1.6 times, reaching a total output of 20,450,000 tons. In addition, the output for 1930 was 26,530,000 tons, which was double the output for 1912. This indicates that Chinese coal production was 60 per cent that of Japan's in the second decade of this century, 70 per cent of Japan's in the 1920s, and 80 to 90 per cent that of Japan's in the 1930s. The production standard of Chinese coal mining thus was more or less in line with that existing in Japan, thus revealing it to be that of a semi-advanced nation.

The internal structure of the coal-mining industry in China, however, tended to be remarkably colonial and imbalanced. First, as shown in Table 3, nearly 46 to 56 per cent of the nation-wide coal output in China was controlled by foreign investors. Second, coal mines managed by native investors were predominantly small and of the endogenous type. Nevertheless, they accounted for more than 30 per cent of the nation-wide output, while the large, modern coal mines accounted for as little as 10 per cent of the total output. Third, as seen in Table 4, the Japanese-run Fushun Coal Mine and the British-run Kailuang Coal Mine alone occupied as much as from 32 or 33 per cent to 47 or 48 per cent of the total nation-wide output. The monopolistic control of the market by the colonial powers was extended further due to their control of the railways; in consequence, the development of modern coal mining by native Chinese investors was suppressed. As shown in Table 4 and 5, the coal was predominantly for domestic use. Coal consumption for modern and capitalistic

purposes, such as for factory fuel and transportation, was extremely limited, which was clearly in great contrast to the coal consumption pattern existent in Japan.

With regard to the actual circumstances of the modern coal mines in this stage, the main areas of coal production, as seen in Table 6, were in Hebei Province, where Kailuang Coal Mine was located, and in Manchuria, where Fushun Coal Mine was located. Other notable coal-producing areas were Henan, Shantung, and Shansi provinces. Table 7 shows the output per coal mine. In other words, the Japanese-run Fushun Coal Mine and Kailuang Coal Mine, which was a Sino-British joint venture, were the two giants, producing 6,620,000 tons and 3,580,000 tons respectively in 1926. Large coal mines with an annual output of about 500,000 tons were Zhongxing Coal Mine, run with native capital, and Luda Coal Mine, which was a Sino-Japanese joint venture. In 1926 they produced 600,000 tons and 700,000 tons respectively. There were only three coal mines with an approximate output of 300,000 tons. They were Jingxing Coal Mine, which was a German-Japanese joint venture; Benxihu Coal Mine, which was a Sino-Japanese joint venture; and the Chinese-run Baojin Coal Mine. The output in 1926 for these three mines was 330,000 tons, 410,000 tons, and 330,000 tons respectively. There were nine medium coal mines with an annual output of about 100,000 tons and 12 with less than 100,000 tons. Concerning the degree to which these coal mines were modernized, it can be seen that while the two gigantic ones were remarkably modernized, other large coal mines with an annual output of 300,000 to 500,000 tons were modernized to the extent of the previously analysed large Japanese coal mines in the Chikuho region at the end of the Meiji Period.[31]

Furthermore, although data available on the mining population is again limited, the number of mining workers in the 1920s was estimated to be 220,000 by Chugoku Kōgyō Kiyo [The proceedings of Chinese mining], published in 1929.[32] Toargasheff, however, has refuted this estimate on the basis that miners with endogenous skills were excluded from the estimate. Thus, he made an estimate on the basis of the output volume and arrived at the figure of 460,000 or more mining workers.[33] It can, therefore, be stated in this regard that the mining labour market in

China was comprised of one group of mining workers with modern occupational skills and a huge number of mining workers who belonged to the other group with endogenous skills.

TABLE 2. Coal Output in China (Unit: tons)

Year	Output in China	Ratio against Japanese output	Japanese output
1912	1,300	66	1,963
1913	1,349	63	2,131
1914	1,410	63	2,229
1915	1,341	65	2,049
1916	1,564	68	2,290
1917	1,690	64	2,636
1918	1,833	65	2,802
1919	2,005	64	3,127
1920	2,125	72	2,924
1921	2,045	77	2,622
1922	2,109	76	2,770
1923	2,455	84	2,894
1924	2,576	85	3,011
1925	2,425	77	3,145
1926	2,304	73	3,142
1927	2,417	72	3,353
1928	2,509	74	3,386
1929	2,593	75	3,425
1930	2,653	84	3,137
1931	2,724	97	2,798
1932	2,600	92	2,805
1933	2,816	89	3,152
1934	3,232	89	3,592
1935	2,641	69	3,776
1936	2,705	72	3,741

Note: Data from Shina Kōgyō Ron [A study on Chinese mining] by Bauer, pp. 48-49. The figures for Japan, however, are taken from Hompo Kōgyō no Sūsei [Mining trends in this country].

TABLE 3. Coal Output in China According to the Origin of Capital (%)

Year	Foreign capital					Native capital			
	Japanese	British	German	Russian	Sub-total	Large coal mines	Small coal mines	Sub-total	Total
1918	20.2	22.0	3.5	0.9	46.6	14.2	39.2	54.4	100.0
1920	20.9	23.9	2.0	1.4	48.2	16.8	35.0	51.8	100.0
1922	24.9	20.2	2.3	0.9	48.3	16.5	35.2	51.7	100.0
1924	27.6	20.4	2.0	0.9	50.9	19.4	29.7	49.1	100.0
1926	32.7	16.8	1.5	1.2	52.2	14.5	33.3	47.8	100.0
1928	33.1	19.8	1.1	2.3	56.3	12.6	31.3	43.7	100.0

Note: Data from Shina no Tetsu, Sekitan Oyobi Sekiyu [Iron, coal, and oil in China] by Wu Ban-nong, translated by Chūshi Kensetsu Shiryō Seibi Iinkai, 1941, p. 35.

TABLE 4. The Market Share of Two Major Colonial Coal Mines (%)

Year	Fushin Coal Mine	Kailuang Coal Mine	Two major coal mines
1912	11.6	-	-
1913	16.9	13.0	29.9
1914	15.9	17.7	33.6
1915	16.7	21.3	38.0
1916	13.6	18.5	32.1
1917	14.1	17.7	31.8
1918	14.3	17.7	32.0
1919	15.1	16.9	32.0
1920	15.1	19.7	34.8
1921	11.1	21.3	32.4
1922	18.5	17.3	35.8
1923	20.4	18.3	38.7
1924	21.9	16.7	38.6
1925	28.7	16.2	44.9
1926	-	13.1	-
1927	29.3	19.1	48.4
1928	29.3	18.3	47.6
1929	28.6	17.8	46.4
1930	26.5	20.0	46.5
1931	23.1	19.1	42.2
1932	23.1	19.4	42.5
1933	25.9	14.5	40.4
1934	24.5	23.1	47.6

Note: The above was formulated from a table cited later. The statistics on the output of Kailuang Coal Mine are from the aforementioned "80 Years of the Kailuang Coal Mine," p. 80.

TABLE 5. Composition of Chinese Coal According to Usage in 1934 (%)

	China	Manchuria	Japan
Railways	8.4	21.8	10.0
Mining	7.6	16.7	15.6
Shipping	5.4	15.1	11.4
Industries	28.6	19.6	46.0
Domestic	50.0	26.8	17.0
Total	100.0	100.0	100.0

Note: From Masao Tezuka, Sina no Tetsu, Sekitan to Tōa [Iron and coal in China and East Asia], Sujaku Shorin, 1943, p. 130. The figures for China exclude those for Manchuria.

TABLE 6. Chinese Coal Output by Province (Unit: tons)

	1913		1920		1930	
	Output	%	Output	%	Output	%
Hebei Province	614.5	45.6	622.2	29.2	736.3	27.7
Henan Province	-	-	152.9	7.1	107.0	4.1
Shantung Province	-	-	136.3	6.4	145.8	5.4
Shansi Province	110.0	8.1	78.7	1.8	220.4	8.3
Chiangsi Province	-	-	83.2	1.9	45.6	1.7
Manchuria	354.8	26.3	436.3	20.5	1,019.5	38.4
Others	-	-	703.6	33.1	384.7	14.5
Total	1,344.9	100.0	2,125.9	100.0	2,653.6	100.0

Note: The above was formulated from different parts of Bauer's Shina Kōgyō Ron [A study on Chinese mining].

TABLE 7. Output of Major Coal Mines (Unit: 10,000 tons)

Name of coal mine	Location (province)	1926	1927	1928	Capital
Kailuang	Hebei	358.2	368.3	495.8	Chinese/English
Jingxing	Hebei	33.9	34.1	26.8	Chinese/German
Zhengfeng	Hebei	10.9	1.5	8.4	Chinese
Mentougou	Hebei	16.0	8.0	0.6	Chinese/English
Lincheng	Hebei	10.5	6.2	-	Chinese
Yili	Hebei	23.7	6.9	12.0	Chinese
Liuchiang	Hebei	21.2	16.4	13.1	Chinese
Changcheng	Hebei	15.0	12.0	15.0	Chinese
Baojin	Shansi	33.2	16.0	30.1	Chinese
Jianchang	Shansi	5.5	3.6	3.4	Chinese
Zhongyuan	Henan	5.4	8.3	3.1	Chinese
Fu Company	Henan	11.6	-	-	English
Liuhegou	Henan	27.7	16.5	38.2	Chinese
Minsheng	Henan	6.0	12.0	8.0	Chinese
Dacheng	Henan	9.0	13.0	5.0	Chinese
Zhongxing	Shantung	60.3	25.9	-	Chinese
Luda	Shantung	70.8	74.2	61.5	Chinese/Japanese
Huamingling	Shantung	5.8	5.2	4.9	Chinese/Japanese
Huaxing	Chiangsi	7.5	18.3	16.3	Chinese/Japanese
Polé	Chiangsi	5.2	6.6	7.2	Chinese/Japanese
Fuyuan	Hubei	6.5	8.6	9.7	Chinese/Japanese
Lieshan	Anhuei	11.6	8.0	3.6	Chinese/Japanese
Datong	Anhuei	5.5	6.5	6.5	Chinese/Japanese
Jiawang	Chiangsu	8.8	3.7	5.9	Chinese/Japanese
Fushun	Fengtian	662.4	710.1	735.2	Japanese
Benxihu		41.5	39.8	49.0	Chinese/Japanese
		1925		1930	
Zhalainuoer	Heilungchiang	12.3		0.5	Japanese
Hegan	Heilungchiang	1.3		18.7	Chinese
Muleng	Chilin	8.0		32.3	Chinese/Japanese

Note: The above formulated from Bauer's Shina Kōgyō Ron and Wu Ban-nong's Shina no Tetsu, Sekitan oyobi Sekiyu.

TABLE 8. The Scale of Modern Coal Mines in China in 1926

Output	Number of coal mines	Of which foreign capital
More than 1,000,000 tons	2	2
More than 500,000 tons	2	1
More than 300,000 tons	3	2
More than 100,000 tons	9	3
More than 50,000 tons	12	1
Total	29	9

Note: Formulated from Table 7.

The Third Stage: Modern Coal Mining's Development and Adversity in China

Chinese coal mining in its third stage was subjugated by further colonization due to the Japanese invasion of Manchuria, after the Manchurian Incident in 1931, as well as into the rest of China, after the China Incident in 1937. Owing to internal disturbance, Chinese coal mining became impoverished. In 1932 Japan dreamt of creating a great colonial empire through the establishment of Manchukuo in the northeastern region, where various mines, factories, and raw materials would be state-owned.[34] Moreover, it was at the time of the China Incident in 1937 that the Japanese military took over Chinese coal mines in various regions and aimed at establishing a colonial empire under the name of the Greater East Asia Co-Prosperity Sphere.

Once the coal mines were under military control, the Japanese government sent Japanese coal mine engineers and some skilled miners so as to restore the coal mines, thus enabling the development of modern coal mines to start afresh. For this purpose, the government established a Sino-Japanese coal mine in a joint venture to mobilize Chinese capital. The government formed the Northern China Development Company, which consisted of powerful Japanese coal mine managers who were the investors of the Japanese share of the capital. In this manner, the mines were put

under an economy which was controlled by the government. Because of the difficulties entailed in the procurement and transportation of required materials and the hiring of a work force, the great plan of coal mine development was not carried out. The increasing anti-Japanese activity and the disaster brought by war, however, caused Japan to become more aggressive, and coal development took the form of plunder. Japan's defeat ended the invasion into China and the colonial coal mine management likewise ceased.

The process of the modernization of coal mining in China was similar to that of Japan in the sense that it was achieved through the transfer of advanced Western technology to an economically less-developed nation. However, the modernization process was drastically different from that of Japan in view of the fact that it was pursued during a period of colonial control by the great powers. This control suppressed economic development in China so greatly that it was inevitable that Chinese coal mining should face various difficulties. Japanese colonial coal mine management in China thus was carried out under such adverse circumstances. The experience, in fact, presents interesting material for study, namely, the manner in which technology transfer and transformation were pursued in a socially and economically less-developed nation as well as the related problems caused by the said transfer and transformation.

III. THE DEVELOPMENT OF FUSHUN COAL MINE WITH JAPANESE CAPITAL

1. An Outline of Fushun Coal Mine

With its invasion into China, Japan came to manage many coal mines.[35] Japanese colonial coal mine management in China comprised various types. In terms of the length of operation, the first type were those which were run on a relatively long-term basis. For example, Fushun Coal Mine and Benxihu Coal Mine in Manchuria had been operated since the early twentieth century. The Liuchuan Coal Mine and Fangzi Coal Mine, which was run by Luda Gongsi in Shantung Province and was obtained from Germany after World War I, also were operated since this century's early years. The other type consisted of a group of coal mines which were managed after the establishment of Manchukuo In 1932, as well as other coal mines such as Kailuang Coal Mine, Zhongxing Coal Mine, and Jingxing Coal Mine, which came to be controlled as a result of the Japanese invasion into the entire nation after the China Incident in 1937. Moreover, viewed in terms of management, there were state-run coal-mining corporations as well as one private corporation. This privately managed coal mine was Benxihu Coal Mine, which was run by Ōkura Gumi. All the other coal mines were somehow affiliated with state-policy corporations. Fushun Coal Mine was managed by the South Manchurian Railway Company (henceforth called Manchurian Railway), which was a giant government-owned colonial development corporation, and other coal mines were managed by a state-policy corporation which consisted of joint investments made by coal-related companies.

In accordance with the objective of this paper, Fushun Coal Mine and the Benxihu Coal Mines, which were managed on a long-term basis, are particularly interesting as a research theme rather than the short-lived coal

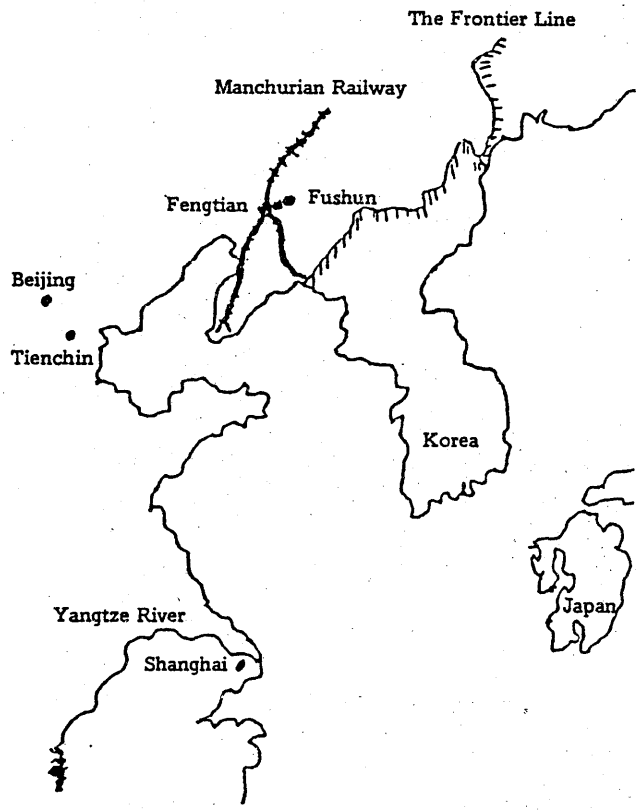

FIG. 2. Map Showing Fushun and the Manchurian Railway

mines under the military government. The management of the latter tended to be unstable and of a exploitative nature. Fushun Coal Mine, a typical Japanese colonial coal mine with long-term management, [36] will be examined in order to clarify the problems entailed in technological transfer from Japan to a lesser-developed nation.

Fushun Coal Mine was developed by the Chinese at the end of the nineteenth century and was later modernized by the Russians. It was subsequently occupied by the Japanese military during the course of the Russo-Japanese War in 1905. It was developed and modernized tremendously as a representative Japanese coal mine and in 1907 was placed under the management of the Manchurian Railway. Fushun is located at the center of Liaoning Province (former Fengtian Provinced), in the region of former Manchuria. The coal field is a thin strip running 17 kilometres from east to west

and from one to 2.5 kilometres from north to south. The strike lies in an east-west direction and has an acute incline of 20 to 40 degrees with an outcrop at the southern end. The estimated coal deposits in 1938 were 750 million tons. The coal bed, which is classified as belonging to the tertiary stage of the early Cenzoic Period, is thick, its average depth being 40 metres. This thickness varies, however, from six metres at the eastern end to 130 metres at the western end. The coal, because it is free-burning bituminous coal with an average calorific value of 6,960 calories, is graded as excellent. There is a gigantic oil shale with estimated deposits of 5,400 million tons at Fushun; thus, a chemical plant was established as an affiliate operation of the Fushun Coal Mine.[37]

The Japanese government obtained the railway and mine concessions in Manchuria as a result of the Russo-Japanese War. Manchurian Railway invested the great sum of ¥235,350,000[38] between 1907 and 1935 for the development of Fushun Coal Mine, and transformed a medium-sized coal mine into the largest and most modern coal mine in the Orient. The developmental process of Fushun Coal Mine undertaken by Manchurian Railway can be divided into three technological stages. The first was the period from 1907 to 1919. To establish Fushun Coal Mine as a gigantic colonial coal mine, the authorities restored the devastated coal mine, transferred accumulated coal-mining technology from Japan, and pursued large-scale development in accordance with two 5-year plans. In the second stage from 1920 to 1930, the authorities not only accumulated unique technology pertaining to the development of Fushun Coal Mine but also introduced advanced Western technology. Fushun Coal Mine thus became the largest and most modern coal mine in the Orient, superseding Kailuang Coal Mine, which was a gigantic British colonial coal mine. The third stage was from 1931 to 1945, that is, from the Manchurian Incident to the destruction of Manchukuo. During this stage, the authorities further developed Fushun Coal Mine to make it one of the big economic centres of the colonial empire. With Japan's defeat, however, Fushun Coal Mine ceased to exist as a colonial coal mine.

During this coal mine's half century of development, three characteristic trends are evident. The first is that the development of Fushun Coal

Mine was pursued comprehensively and carefully over a long period of time. This was because the development was pursued by Manchurian Railway, which was a very large, semi-governmental, state-policy corporation. In consequence, an easy, short-term exploitation of the mine by Mitsui, Mitsubishi, and other emerging zaibatsu and coal-mining capitalists was avoided. This point becomes clear upon comparing the development of Benxihu Coal Mine by Ōkura Gumi[39] and Kailuang Coal Mine by private British capital.[40] The second characteristic pertains to the fact that Fushun Coal Mine not only fully utilized the latest technology accumulated by Japanese coal mining, but also was active in transferring advanced foreign technology through the investment of big capital — something which could not have been done on an individual scale. Consequently, as advanced foreign technology was being mastered, Fushun Coal Mine acquired its own technology for development. Thus, it became the largest and most modern coal mine in the Orient. The third characteristic is that the development was carried out carefully and gradually, taking both colonial conditions and the unique conditions in China into consideration. Technologically, the management gradually came to understand the characteristics of the Fushun coal field and Fushun coal. Based upon the Japanese technological experience, the management searched for and gradually created the kind of technology suitable for this mine rather than seeking for a sudden transformation. In addition, with regard to the procurement and management of labour, the management took Chinese labour conditions into consideration. For example, a seemingly irrational and pre-modern contractor system (the so-called Bautou System) was utilized through a modification of the Japanese experience rather than introducing the Japanese method automatically. The management modified the system to pursue the principles of capitalism as well as to attain its own goals. The following is an examination of the developmental process undertaken at Fushun Coal Mine.

2. The Developmental Process of Fushun Coal Mine

a. The Modernization of Fushun Coal Mine in Its First Stage

Prior to the onset of large-scale development by Manchurian Railway, the Japanese development of this mine started with the Japanese military occupation. The Japanese Army defeated the Russian Army at a battle near Fengtian in March 1905, and gained control of Fushun Coal Mine. The Army restored the mine, which had been destroyed by the fleeing Russians, excavated new pits, and secured the necessary coal for military and railway consumption. Under the Russian military regime there were already three pits, namely, Qianjinzhai Pit, Yangbaibao Pit, and Laohutai Pit, which, with about 1,000 workers, produced nearly 100,000 tons annually. The Japanese Army brought engineers and skilled miners from Japan and persuaded the Chinese workers to remain and work for the Japanese Army. Thus coal extraction at Qianjinzhai Pit, which had escaped destruction, was started; an old pit was drained; and even new pits were excavated.[41] Japanese Army management lasted until the management was transferred to Manchurian Railway in April 1907. After this transfer a large amount of capital was invested for development.

As shown in Table 9, in the 12 years between 1907 and 1919, the government invested ¥45,960,000 for such items as existing facilities and machinery. This money also went into the mining district. Manchurian Railway invested an additional ¥45,910,000. With this huge investment, the management was able to improve and maintain the old pits, excavate six new pits in stages, and mechanize the mining process. As shown in Table 11, Fushun Coal Mine used to be a medium-sized coal mine with an annual output of about 200,000 tons initially. By 1913, or in seven years, however, it had suddenly grown into a gigantic coal mine with an annual output of about two million tons. When compared with the Mitsui's Mi-ike Coal Mine, which was the largest in Japan, the rapidity and the magnitude of the development pursued at Fushun Coal Mine can be clearly seen. As shown in Table 12, Mitsui purchased Mi-ike Coal Mine from the government in 1889 at a cost of ¥4,550,000; an additional ¥18,970,000 was invested by 1919. The total sum of ¥23,530,000 was, therefore, approximately half that of the amount newly invested at Fushun Coal Mine, and approximately only one quarter of the total investment in Fushun. As far as the output was concerned, Fushun Coal Mine superseded that of Mi-ike Coal Mine around 1912 or 1913 and became the largest coal mine in Japanese territory.

TABLE 9. Investment at Fushun Coal Mine (1) (Unit: ¥1,000)

	Government investment in kind	1907-1911 First 5-year plan	1912-1916 Second 5-year plan	1917-1919	Amount of new investment	Total investment
Mining district	45,483	-	-	321	321	45,804
Land	55	363	414	1,557	2,334	2,389
Mine opening	41	1,359	1,251	2,246	4,856	4,897
Plant	3	384	419	523	1,326	1,329
Machinery	178	3,347	5,451	8,366	17,164	17,342
Building	26	2,016	1,382	1,745	5,143	5,169
Engineering	175	260	1,534	1,289	3,083	3,258
Other	-	950	3,707	7,017	11,683	11,683
Total	45,961	8,688	14,158	23,064	45,910	91,871

Note: Formulated from Mantetsu Dainiji Jūnen-shi [The second 10-year history of the Manchurian Railway], p. 685. "Other" includes investments in power and chemical plants.

TABLE 10. The Investment Budget for the First 5-Year Plan
(Unit: ¥1,000)

Item	Amount
Ground rental	50
Test boring	30
Building cost for offices, plants, and warehouses	380
Building cost for company housing in the city	1,130
Water, electricity, gas, and heating installation	380
Plant machinery	130
Machinery and tools for other usage	160
Excavation cost of the Ōyama Pit	2,790
Excavation cost of the Tōgō Pit	2,300
Maintenance for three old pits	480
Excavation cost of the Yantai branch pit	450
Various installation costs	410
Additional budget	500
Total	9,190

Note: Formulated from Mantetsu Jūnen-shi, p. 491.

TABLE 11. Output According to Pits at Fushun Coal Mine (Unit: tons)

Year	Gianjinzhai	Yanbaibao	Laohutai	Ōyama	Tōgō	Wandawu	Longfeng	Xinton	Yantai	Total	Mi-ike Coal Mine	Kailuang Coal Mine
1907	10.3	6.4	6.5	-	-	-	-	-	-	23.3	150.1	95.9
1908	23.8	12.7	12.4	-	-	-	-	-	-	49.0	152.7	-
1909	33.0	17.8	19.6	-	-	-	-	-	-	70.6	157.4	123.1
1910	36.8	21.7	27.8	1.4	1.8	-	-	-	1.5	91.3	179.0	120.9
1911	40.8	30.5	28.6	19.2	13.9	-	-	-	3.9	138.2	198.9	135.9
1912	38.4	21.0	26.2	35.9	25.2	-	-	-	4.3	151.3	217.3	163.6
1913	58.1	29.2	47.6	41.7	41.7	-	-	-	9.5	228.0	217.2	203.6
1914	64.5	38.3	41.1	23.6	47.0	-	-	-	9.6	224.4	205.7	279.8
1915	71.7	47.3	18.4	30.3	42.9	6.1	-	-	7.1	224.0	172.6	297.8
1916	74.7	50.2	25.6	29.8	16.8	6.5	-	-	9.1	213.1	187.8	284.4
1917	85.9	58.5	29.1	13.5	28.8	10.9	0.5	-	11.3	238.9	199.8	317.6
1918	74.6	50.1	39.3	32.8	31.9	15.7	4.6	-	10.6	262.7	187.3	326.2
1919	89.2	48.0	42.6	43.5	33.5	17.3	16.5	2.0	11.0	303.8	195.7	376.2

Note: From Manshū Kaihatsu Yonjūnen-shi [A 40-year history of Manchurian development] Vol. 2, p. 66.

TABLE 12. Investment at Mi-ike Coal Mine (Unit: ¥1,000)

Details		Amount
Purchase cost from the government in 1899		4,555
Amount of investment between 1889 and 1906		8,749
Amount of investment between 1907 and 1919		10,230
Breakdown	1907-11	3,543
	1912-16	2,868
	1917-19	3,819
Total		23,534

Note: Formulated from Yutaka Kasuga, "Mitsui Zaibatsu ni Okeru Tankōgyō no Hatten Kōzō" [The structure of coal-mining development by Mitsui Zaibatsu] and "1910 Nendai ni Okeru Mitsui Kōzan no Tenkai" [The development of the Mitsui Mines, 1910-1920] in Mitsui Bunko Ronsō [The Journal of Mitsui Research Institute for Social and Economic History], Nos. 11 and 12, November 1977, pp. 112-115, November 1978, p. 101.

Upon realizing the capacity of Fushun Coal Mine, the chief executives of Manchurian Railway invited Takeichirō Matsuda to head this mine. Since he had been the director of Mitsubishi's Namazuta Coal Mine, which had developed into a very modern coal mine, he was entrusted with drafting and executing the first development plan.[42] Upon graduating from the University of Tokyo, where he studied in the Science Department's Mining and Metallurgy Section, Matsuda immediately entered Mitsubishi. He was sent to the Takashima Coal Mine the following year, and in 1897, as manager of Shinyū Coal Mine, he developed a new pit. He became the director of Namazuta Coal Mine in 1903 and worked for its modernization. He was one of the leading figures in the field of coal-mining technology in Japan.[43]

As shown in Table 9, ¥8,680,000 was invested to actualize the first 5-year plan. The characteristics regarding the development of Fushun Coal Mine according to the first 5-year plan were as follows: First, Japanese engineers who had no experience extracting coal from a thick coal bed, as a provisional solution resorted to relying upon the coal-pillar method, which was a form of modern coal extraction technology used in Japan. Second, the main development project aimed at the excavation and mechanization of the Ōyama and Tōgō pits. As can be seen in Table 10, the main portion of the amount invested for the first 5-year plan went for the excavation of these two pits. They were large pits, Ōyama Pit taking two and a half years and Tōgō Pit one year and nine months to complete. Double pits were excavated for each of them with a portal measuring 6.3-by-5.4 metres. The pits were 372 metres deep.[44] These large pits were so advanced that the same type in Japan at that time could only be found at the Miyanoura and Manda pits of Mi-ike Coal Mine.[45] Third, the mine, with the establishment of a small electric power plant, was run with electricity. Moreover, it was planned that the necessary mining machinery would be produced self-sufficiently at a factory established for this purpose.

With the enacting of the first 5-year plan, Fushun Coal Mine's output grew from 230,000 tons in the first year to 1,380,000 tons by the fifth year. Three old pits, namely, Qianjinzhai, Yangbaibao, and Laohutai, were gradually mechanized and increased their output. Qianjinzhai Pit

consisted of two pits and numerous adits, and the cumulative distance of all the major pits and adits came to 5,698 metres. As for hoisting in the mine, there were four Lancashire model and three Cornish model steam engines. Furthermore, there were 14 pumps for drainage.[46] The output increased from 100,000 tons in 1907 to 400,000 tons in 1911, as shown in Table 11. Seizoku Yonekura was invited to head the mine upon Matsuda's death. Yonekura drafted the second 5-year plan, spent ¥4,150,000, and aimed at further modernization. An additional sum of ¥23,060,000 was invested in a three-year period up to 1919. Fushun Coal Mine was thus rapidly modernized and suddenly emerged as the largest coal mine in Japanese territory.[47] There are several noteworthy characteristics pertaining to the development of Fushun Coal Mine during this period.

The first point was that the basis for beginning the second developmental stage of Fushun Coal Mine was the opening of three additional pits — Wandawu, Longfeng, and Xinton — as well as the beginning of strip mining. The second characteristic was the introduction of the fine-sand-filling method of coal extraction to replace the coal-pillar method, which had been tentatively adopted. The coal-pillar method of extraction was becoming obsolete in Japan, and its weaknesses also became obvious at Fushun Coal Mine. This method of extraction frequently caused the mine roof to fall as the extraction site became larger and deeper. There was an increased danger of spontaneous combustion because of the oxidation of the coal pillars. This method called for more expenditure on pit wood, supportive pillars, and ventilation. Moreover, there was a crucial defect in this method because only five to six per cent of the deposits in a coal bed could be extracted. Under these circumstances, there was need for a more functional method suitable for a thick coal bed. In many Japanese mines the decision was therefore made to pull down the coal pillars because of the problems associated with them. There thus arose a new safety problem which was to determine how best to fill the mines up safely. The fine-sand-filling method was researched and tested in 1908, and in 1912 it was fully applied at Miyanoura Pit of Mi-ike Coal Mine where the research on this method was advanced.[48] The fine-sand-filling method was a kind of extraction method for a thick coal bed which was developed at Mislowitch Coal Mine in upper Silesia, Germany,

in 1987. According to this method, an inclining coal bed is dug horizontally. The cavity created by the coal extraction on the horizontal level is then filled with a mixture of water, sand, and dirt sent through a pipe from the surface to the bottom of the pit. The coal on the upper level can then be dug horizontally using the sand-filled foundation. With this method it became possible to maximize the extraction efficiancy in a thick coal bed, since spontaneous combustion and a cave-in at the extracted site were prevented. In addition, the pit maintenance cost was decreased.[49] The management of Fushun Coal Mine took note of this method and sent their own engineers to Europe to master the technology. Thus, the sand-filling method was tested at Yanbaibao Pit in 1912 and achieved excellent results. Consequently, using their own sand-filling equipment, the management began coal extraction in accordance with the fine-sand-filling method at the Ōyama and Tōgō pits in 1913.[50] This method thus gradually spread to other mines. This revolutionary coal extraction method at this stage, however, was no more advanced than the chamber method, which was merely an extension of the coal-pillar method. There were such defects as short walls, short and sporadic faces, high maintenance costs, the danger of cave-ins, and the difficulty of filling due to irregular extracted sites created by the horizontal digging of an inclining coal bed. The objectives of the second stage, therefore, were to find a means to oversome these defects.

The third characteristic regarding development in this period pertains to the establishment of more electric plants, thus resulting in the electrification of the mine.[51] Two small-scale electric generators, each having a capacity of 1,000 kilowatts, had been installed in 1909. The introduction of the fine- sand-filling coal extraction method, to a large extent, triggered the further establishment of electric power plants because the sand-filling device had to be run on electricity. Thus, coupled with the adoption of the fine-sand-filling method, a number of electric generators were installed in succession, namely, one 1,500-kilowatt unit in 1913, two more of the same in the following year, one 5,000-kilowatt unit in 1915, and two 3,000-kilowatt units in 1917. The electric supply was steadily increased and as shown in Table 13, went from 5,180,000 kilowatt-hours in 1911 to 30,850,000 kilowatt-hours

in 1916. By 1918 the supply had increased to 60,590,000 kilowatt-hours, which was more than the electric supply at Mi-ike Coal Mine.

The fourth point to be noted is the fact that mechanization inside and outside the mine progressed because of the increased electric supply.[52] The mechanical capacity was increased tremendously and the cost of coal extraction was lowered because of the switch from conventional steam power to electric power. Moreover, mechanization in the mine which was difficult with steam power became possible with electricity. Thus the railway coal transport at the surface and the sand transport for filling were entirely electrified by 1914. The hoisting, drainage, and coal-selecting machines were gradually electrified and their capacity was increased. Not only manual power but also steam shovels and excavators were beginning to be used for sand extraction, and power shovels also were beginning to be used for strip mining. Mechanization in the mine was extended due to the fact that the sand-filling device as well as coal transport were entirely mechanized. The working conditions in the mine also were improved tremendously as a result of the installation of electric lighting in the main pits and passages and at pumping and hoisting sites. During this stage, mechanization at the coal face was not pursued at all and coal extraction was operated by manual labour as it had been all along. Coal transport inside and outside the mine was, to a large extent, done manually. The mechanization standard at Fushun Coal Mine at this stage was about the same as that of an advanced coal mine such as Mi-ike Coal Mine.[53]

The fifth noteworthy point is the fact that during this stage a self-sufficient production system of coal-mining machinery and tools was enlarged due to the completion of factories which were attached to the mine. The adoption of a gas generator made it possible to establish chemical plants,[54] which were instrumental in turning Fushun Coal Mine into an industrial complex. A factory was established in 1908 at Qianjinzhai Pit. A divisional work process system was completed in 1913 with the establishment of four plants, namely, a finish and lathe plant; a boiler-manufacturing plant; an iron-work, casting and wooden-moulding plant; and an electric machinery and appliances plant. In 1918, a cast

TABLE 13. The Electric Supply at Fushun Coal Mine (Unit: kwh)

Year	Fushun Coal Mine	Mi-ike Coal Mine
1908	13.2	532.2
1909	88.8	691.7
1910	230.7	1,007.4
1911	518.1	1,260.8
1912	669.6	1,668.4
1913	893.9	2,059.4
1914	1,365.7	2,488.8
1915	1,927.8	2,730.7
1916	3,085.5	3,309.5
1917	4,576.0	5,010.4
1918	6,059.9	5,119.0
1919	7,316.1	5,027.7

Note: From "Nippon Kōgyō Hattatsu-shi" [The historical development of Japanese mining], Konwa-kai, Vol. 2, p. 605. The figures pertaining to Mi-ike are from the aforementioned "Mitsui Zaibatsu ni Okeru Sekitangyō no Hatten Kōzō," Kasuga Thesis, p. 135.

steel mill was added. There was a need to produce coal-mining machinery self-sufficiently because Fushun was far from Japan proper and also because the Chinese mechanical industry was insufficiently developed. The factories at this stage thus came to produce sand-filling devices, hoists, coal transporters, selectors, and pumps. Furthermore, in 1918 the Fushun factories contributed to the establishment of the Anshan Iron-Manufacturing Plant, which was under Manchurian Railway management. The machine production standard of Fushun Coal Mine, however, was somewhat low and part of the latest coal-mining machinery had to be imported from the West, as had been the case with the advanced coal mines in Japan. For example, Mond-model gas generators, ammonia recovery devices, turbines, and large-scale steam boilers were imported from Britain, the United States, and Germany.

In view of the fact that the Mond-model gas generator used gasified coal

of inferior quality, a chemical plant for the production of ammonium sulphate was established. In addition, a sulphuric acid plant was established in 1916, a blasting powder plant in 1917, and an oxyhydrogen plant in 1919. Since a coke plant also had been established, Fushun Coal Mine thus began to turn into a great industrial complex.

b. The Modernization of Fushun Coal Mine in Its Second and Third Stages

An overall characteristic of the technological development at Fushun Coal Mine from its second stage onward was that a marked technological innovation was triggered by the post-World War I depression and the Great Depression. In other words, the engineers of Fushun Coal Mine furthered the standard of technology which had been accumulated through 12 years of management. Moreover, they had transferred and acquired more advanced technology from the West. As a result, they were able to develop an independent technology and made it the largest coal mine in the Orient.

The investment amount at Fushun Coal Mine from 1920 cannot be broken down into two stages because of insufficient data. As shown in Table 14, investment in a seven-year period from 1920 to 1926 was ¥47,720,000, and in a nine-year period from 1927 to 1935 was ¥78,060,000, making a total of ¥134,780,000 for the 16 years. This was a huge sum, as it was three times that of the amount initially invested in the first stage. Incidentally, investment at Kailuang Coal Mine (which was another large colonial coal mine), from its establishment to 1937, is said to have been £2.9 million (¥49.3 million).[55] This was mainly British capital, the current value being £5.5 million (¥93.5 million).[56] When compared with the amount invested at Kailuang Coal Mine, it becomes clear that the investment in Fushun Coal Mine was tremendous.

Consequently, as shown in Table 15 Fushun Coal Mine's output increased rapidly. The 3.2 million-ton output. Of 1920 was doubled to 6,620,000 tons by 1926, and by 1930 it had hit the seven million-ton mark. Despite a drastic decrease in production during the Great Depression, the output again increased rapidly in the process of industrial rationalization.

It hit nine million tons in the latter half of the 1930s, and there was a record-making output of 9.8 million tons in 1937, which was the highest output in its history. Fushun Coal Mine's output in the 1930s accounted for approximately a quarter of China's coal output. Kailuang Coal Mine, which had had the largest output in China, was surpassed in 1922, and the gap between the two widened steadily until the output of Fushun Coal Mine doubled that of Kailuang Coal Mine in 1935. The development, however, was not simply limited to increased output. As will be pointed out in detail later, a tremendous investment was made at Fushun Coal Mine toward pursuing technological innovation. Kailuang Coal Mine, on the other hand, stagnated in its technological development.

TABLE 14. Investment at Fushun Coal Mine in the 1920s and 1930s (Unit: ¥1,000)

1920-1926		1927-1935	
Item	Amount	Item	Amount
Mining district	2,024	Power shovel for strip mining	4,000
Land	5,555	Electric engine	5,460
Mine opening	3,169	Dump truck	3,280
Plant	2,119	Skip device	2,490
Machinery	11,510	Coal selector	940
Building	5,328	Excavation of the Longfeng Pit	5,240
Engineering	4,388	Installation of additional generators	10,960
Others	13,627	Moving cost of the factory plant	1,250
		Others	44,440
Total	47,720	Total	78,060

Note: Data for 1920 to 1926 from Mantetsu Dainiji Jūnen-shi, p. 686. Data for 1927 to 1935 from Mantetsu Sanjūnen Ryaku-shi [An abridged history of the thirty years of the Manchurian Railway], pp. 698-699.

TABLE 15. Output of Fushun Coal Mine (Unit: ton)

Year	Fushun Coal Mine	Kaihang Coal Mine
1920	320.9	420.1
1921	277.8	436.4
1922	392.1	365.7
1923	502.9	449.6
1924	564.2	431.6
1925	-	394.1
1926	662.4	303.7
1927	710.1	462.9
1928	735.2	461.2
1929	743.5	462.0
1930	704.2	532.7
1931	630.3	521.9
1932	600.6	506.9
1933	731.2	408.9
1934	793.9	479.8
1935	811.9	404.2
1936	797.8	473.5
1937	987.8	477.8
1938	950.0	516.7
1939	930.3	652.8
1940	763.3	649.2
1941	707.4	663.3
1942	676.3	665.9
1943	577.0	641.3
1944	502.1	562.5

Note: Mantetsu Kaihatsu Yonjūnen-shi [A 40-year history of Manchurian railway development], Vol. 2, p. 66 and Kairan Tankō no Hachijūnen-shi.

The first point to be noted regarding the development of Fushun Coal Mine in its second and third stages was that there was great technological innovation in the coal-extraction method. Although the fine-sand-filling method, which was effective for coal extraction from a thick coal bed, was introduced and applied widely from 1912 onwards, it was full of defects as it was meant for horizontal digging with short walls. The engineering staff thus researched ways to overcome these defects and in 1920 it "independently"[57] developed a fine-sand-filling method to be used for diagonal digging with successive layers and long walls. This method met with success when it was applied on a test basis at the newly excavated Longfent Pit in the following year. Subsequently, the method was introduced and applied at all the other pits.

The essence of this coal extraction method is as follows: A coal bed is marked off in stratified layers about two metres thick. Coal extraction begins at the roof of the lowest stratum, and when extraction at this stratum is completed the cavity is filled with fine sand. The coal extraction of the successive layer is done in the same manner. According to this method, a hoisting shaft is first extended from a coal pit which is connected either to a pit or an inclined shaft. A shaft along the top and a shaft along the base of the layer are dug from the hoisting shaft into the coal bed compartment. While the former is directly connected to a shaft exclusively for the sand-filling pipe and exhaust, the latter is connected to a shaft exclusively for transport, drainage, and intake. A preparatory shaft 80 to 100 metres long is dug along the base shaft, from which faces 40 to 50 metres long are created on both sides. A sand-filling shaft is dug at the centre of the top shaft into the base shaft. Coal is extracted upward from both coal faces, making a cone shape toward the top shaft. As the cavity created by extraction enlarges, it is filled with sand sent through the pipe. Thus further extraction becomes possible. Extracted coal is sent from both ends of the face to the shaft through a chute and then is carried out in a coal cart. When extraction at the bottom layer is over, the coal on the next layer is extracted in the same manner. The above comprises one coal face; many coal faces are set up in succession along the extension of the shaft. This extraction method with long-walled coal faces enhanced the extrac-

tion efficiency remarkably. This was because it resulted in an intensification of coal extraction, shortened the length of the pits, decreased maintenance costs of the coal faces and pits, created easier ventilation, and prevented cave-ins and spontaneous combustion. Furthermore, the concentration of coal faces in one area induced favourable conditions for mechanization.[58]

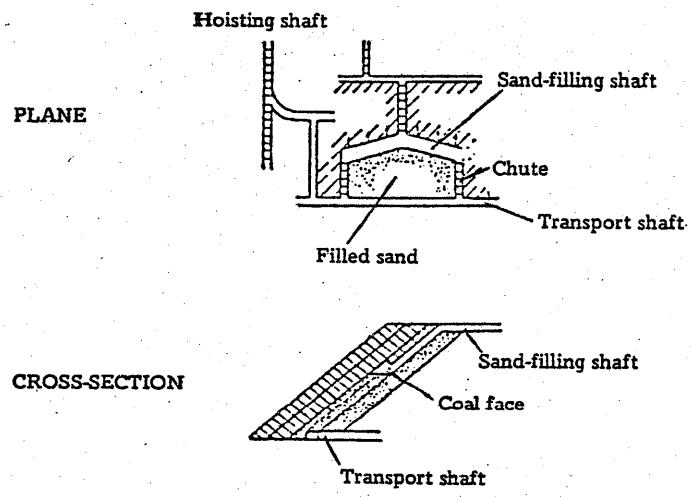

FIG. 3. The Fine-Sand-Filling Method of Coal Extraction According to Diagonal Upward Digging

The second noteworthy point pertains to the fact that mechanization progressed even more due to the two depressions. With regard to the mechanization of extraction work, electric drills and pneumatic rock drills were introduced in 1922 and they became widely used in the 1930s.[59] As seen in Table 16, 55 electric drills and 200 pneumatic rock drills were used in 1936. Coal-mining machines which were imported and given a test run in 1921 did not take root, but finally became prevalent in the 1930s.[60] Incidentally, 14 coal cutters and 58 coal picks were used in 1936 since coal cutting was done by blasting. From 1930, coal transport at the face was mechanized with the introduction of a conveyor.[61] As of 1936, 545 units of various types of conveyor were used. Coal transport completely using conveyors, from the coal face to the portal, was started at the Laowan Great Inclining Shaft in 1936.[62]

Mechanization in the pit also was improved. As seen in Table 17, electric trains for the expansion of coal transport in the pit were introduced and became popular. A great hoisting machine which was able to hoist eight coal carts in four layers was installed at the newly excavated Longfeng Pit in 1932.[63] As far as the surface machinery was concerned, to improve the quality of coal, coal-selecting machines came to be commonly used in the 1920s. In 1927 there were 11 units at Ōyama Pit, six at Tōgō Pit,

TABLE 16. Machinery at the Coal Face (as of 1936)

Excavation Machinery	Number
Drill with 1/2 hp	452
Drill with 1 hp	46
Drill with 1 1/2 hp	52
Sub total	550
Hammer	150
Compressor	51
Cutter	14
Pick	58
Conveyors	
2-hp chain conveyor	227
3-hp chain conveyor	208
Other chain conveyors	67
Sub total	502
Belt conveyor	32
Shaker conveyor	11
Total	545

Note: From Mantetsu Daisanji Jūnen-shi, p. 1,745.

TABLE 17. Conditions Regarding the Introduction of an Electric Mine Train

Pit	Year of Operation	No. of Unit	Weight (tons)	Pull (kg)	Gauge	Distance	Manufacture
Laohutai	1924	1	5	1,100	61	1,090	Tōyō Denki
Tōgō	1928	3	5	1,100	61	2,000	Siemens
Guchengzi	1930	20	12	2,100	90	27,000	Tōyō Denki, Mitsubishi
Ōyama	1931	4	5	1,100	61	1,300	Tōyō Denki
Wandawu	1932	3	5	1,100	61	2,500	GE
Yangbaibao	1933	4	12	2,100	90	8,000	Tōyō Denki, Mitsubishi
Yantai	1934	2	5	1,100	61	5,000	Tōyō Denki
Longfeng	1935	3	10	1,880	75	6,000	Tōyō Denki

Note: From Bujun Tankō Tokuhon, p. 11.

four at Laohutai Pit, and four at Longfeng Pit.[64] A coal washer also was first put to use in 1920, and in 1926, one was imported from Germany and installed at Guchengzi, this was the largest coal washer in the Orient as it had a daily output capacity of 6,000 tons.[65]

Moreover, strip mining became very popular upon entering the 1920s. Comprehensive development regarding strip mining was begun in 1923, and the mechanized transport of coal, mudcap sluff, and capping, as well as that of the extraction itself progressed. In other words, such machines as excavators, electric shovels, dump trucks, electric trains, and skip hoists were introduced.[66] The mechanization of strip mining, however, did not mean the disappearance of manual extraction — there was great difficulty entailed in moving the machinery. But the mechanization from 1920 onward was remarkable. As seen in Table 18, the mine's total electric horsepower was increased about 2.5 times from 1927 to 1936, and the horsepower per miner also was increased by the same amount. The degree of mechanical installation was thus increased tremendously.

The third noteworthy point was that the factory's self-sufficient production

TABLE 18. Horsepower of Electric Machinery (Unit: hp)

Year	Pit extraction	Strip mining	Total	Per miner
1927	27,348	6,536	33,884	0.9
1928	30,182	14,303	44,485	1.3
1929	30,401	13,689	40,091	1.1
1930	31,273	14,279	45,552	1.6
1931	32,505	15,618	48,123	2.2
1932	34,864	22,439	57,303	2.5
1933	38,678	28,065	66,743	2.4
1934	36,810	27,669	64,479	2.2
1935	37,669	28,488	66,157	2.0
1936	56,022	30,230	86,252	2.4

Note: Formulated from Mantetsu Daisanji Jūnen-shi, pp. 1,735-36.

system was reinforced[67] and also that the chemical plant made further progress. An electric furnace which was installed at the mechanical plant in 1919 began to operate in 1920. Good quality claws required for excavators which used to be purchased from outside came to be produced self-sufficiently. The factory system was solidified when the Fushun Ironsmith Co., Ltd. was purchased in 1920, becoming the second plant. In 1927, the plant began to manufacture and assemble dump trucks, which used to be imported. Conveyor machine production was started in 1930, and the production of the Fushun-model machine drill was started in 1932. Furthermore, in 1937 a plant to manufacture special steel from sponge iron was established. Due to the outbreak of war between Japan and the United States, additional plants for iron manufacturing and mechanical engineering were built to reinforce the system of self-sufficient production in the mine. As seen in Table 19, the operational expenses of the factories between 1920 and 1936 came up to ¥41,610,000, which was equivalent to 29 per cent of the total invested at Fushun Coal Mine in the same period.

TABLE 19. Operational Expenses of the Factories (Unit: ¥1,000)

Year	Amount
1920	4,346
1921	2,484
1922	2,164
1923	2,227
1924	2,711
1925	3,442
1926	4,272
1927	1,912
1928	2,119
1929	2,193
1930	1,639
1931	1,255
1932	1,387
1933	1,909
1934	2,291
1935	2,755
1936	3,615
Total	41,617

Note: From Mantetsu Dainiji Jūnen-shi, p. 668, and Mantetsu Daisanji Jūnen-shi, p. 1,872.

The progress made at the chemical plant on the basis of cheap electric power also was remarkable.[68] Research on dry distillation of oil shale was started in 1920. By 1926, a dry distillation furnace unique to Fushun Coal Mine was developed, and a refinery was built at a cost of ¥9.6 million. Moreover, a blasting power plant was established in 1925 and an ammonium nitrate plant in 1928. With the intention of supplementing the shortage of liquid fuel in Japan, research on liquefaction of Fushun coal was started in 1928, and a liquefaction plant was completed in 1938. The chemical industry at Fushun Coal Mine thus made further progress. Consequently, the mine developed into a gigantic coal mine

under the management of Manchurian Railway, a state-policy corporation. This was achieved due to the huge amount of capital invested, the transfer of excellent engineers from Japan and their further training at the mine, the transfer of advanced foreign technology into Fushun's own technology, and an effort toward the self-sufficient production of machinery.

IV. THE EMPLOYMENT OF THE CHINESE AND LABOUR MANAGEMENT AT FUSHUN COAL MINE

1. The Composition of the Labour Force and the Employment Categories of Chinese Labour

a. The Composition of the Labour Force

During Fushun Coal Mine's development, which with Japanese capital lasted for about half a century, the necessary labour force for mine management was created. As shown in Table 20, the total number of employees at Fushun Coal Mine at its founding in 1907 was only 2,589 persons. That number, however, increased as development progressed, and there were 13,649 employees in 1911 and 47,805 employees in 1919. The number of employees either decreased or remained stagnant after the post-World War I depression. During the course of technological development and innovation after the Showa depression of 1927, although the absolute number of employees increased, this growth remained remarkably stagnant in contrast to the great increase in output.

The labour force consisted of various categories. As shown in Table 22, the first category comprised senior, intermediate, and junior engineering staff members who gave technological guidance and oversaw the development and management of the coal mine. A second category comprised senior, intermediate, and junior managerial and office staff members who led the administration and management of the coal mine. A third category consisted of a general labour force who carried out the actual mining work. A fourth category comprised the labour at the mechanical and chemical plants, and a fifth category consisted of general workers in related enterprises tied up with coal mining.

TABLE 20. Number of Employees at Fushun Coal Mine
(Number at the End of Each Year)

Year	Total number of employees	Of which Chinese	Ratio (%)
1907	2,589	1,843	71.1
1908	6,085	5,112	84.0
1909	6,934	5,879	84.7
1910	9,098	7,913	86.9
1911	13,649	12,228	89.5
1912	15,147	13,686	90.3
1913	21,857	20,040	91.6
1914	20,982	19,054	90.8
1915	24,208	22,112	91.3
1916	25,479	23,143	90.8
1917	36,024	33,338	92.5
1918	46,118	42,815	92.8
1919	47,805	44,071	92.1
1920	44,900	41,639	92.8
1921	34,380	31,240	90.8
1922	34,870	32,037	91.8
1923	40,531	37,751	93.1
1924	42,044	39,238	93.3
1925	42,410	39,618	93.4
1926	47,650	44,828	94.0
1927	49,295	46,723	94.7
1928	48,704	45,972	94.3
1929	47,691	44,748	93.8
1930	38,648	35,511	91.8

Note: The above is formulated from Nippon Kōgyō Hattatsu-shi, Vol. 2, pp. 611-612.

TABLE 21. Chinese Labour at Fushun Coal Mine (Full-time Labourers and Regular Workers)

Year	Number	Year	Number
1927	39,450	1932	24,848
1928	35,485	1933	29,781
1929	37,600	1934	30,478
1930	30,050	1935	34,534
1931	23,489	1936	38,124

Note: Formulated from Mantetsu Daisanji Jūnen-shi, p. 1,701. The reason why the numbers are less than those in Table 11 may be due to the omission of contracted labour.

TABLE 22. Labour Categories at Fushun Coal Mine

1. Coal mining engineering staff (including trainees)
   - Senior engineers
   - Intermediate engineers
   - Junior engineers
2. Managerial office staff
   - Senior managerial staff
   - Intermediate and junior managerial staff
   - Intermediate and junior labour management staff (including contractors)
   - General office staff
3. General coal mining labour (including unskilled and non-skilled labour)
   - Labour pertaining to coal-mining machinery
     - Operators of various machines
     - Miners working with machines (surveyors, coal-selecting workers, packers)
   - Coal extraction labour (mainly manual)
     - Pitmen, allocators, other odd-jobbers
4. Labour at mechanical and chemical plants
5. Labour tied to coal mining
   - Construction and engineering labour

In view of the fact that the Fushun Coal Mine was a colonial coal mine under Japanese capital, the following personnel were usually Japanese who were transferred from Japan: senior managerial and engineering staff members, some of the intermediate and junior staff members, general mine workers, and other leading skilled labour in the general labour force. Thus, apart from the senior managerial and engineering staff members, there was a reliance upon the Chinese labour force for intermediate and junior managerial and engineering staff members. The coal-mining industry had developed so much that even in Japan those workers in the category of "engineering and skilled workers," in particular, tended to be insufficient. Thus it was very difficult to transfer this category of worker from Japan to the Fushun Coal Mine. To invite them from Japan, it was inevitable that the labour costs should increase in view of the generally improved treatment given to them in wages and labour conditions.[69] Consequently, as many Chinese as possible had to be hired for such positions as intermediate and junior engineers, managerial staff members, and leading skilled workers. The management, in fact, employed Chinese labour in these positions. As shown in Table 23, the ratio of Chinese skilled workers to the number of Japanese engineers and skilled workers in the category of intermediate and junior engineering and managerial staff members was as follows: The Chinese made up 24.9 per cent in 1907. The ratio, however, increased rapidly, reaching 41.1 per cent in 1908 and 50.7 per cent in 1912. The ratio steadily grew and stayed at 60 per cent in the first half of the 1920s. Due to a change in labour management policy, the ratio as well as the absolute number decreased from 1927 on.

On the other hand, when the Fushun Coal Mine's entire labour force is examined, it is seen that the mine was solely dependent on Chinese labour. As shown in Table 20, The ratio of Chinese workers to the total number of workers increased from 71.1 per cent in 1907 to 90.3 per cent by 1912, and it continued to fluctuate at about 90 per cent.

TABLE 23. Chinese Regular Workers (Skilled Workers) at Fushun Coal Mine

Year	Total number of employees (office and regular workers)	Of which Chinese	Ratio (%)
1907	965	241	24.9
1908	1,621	667	41.1
1909	1,809	782	43.2
1910	1,959	853	43.5
1911	2,624	1,299	49.5
1912	2,872	1,457	50.7
1913	3,178	1,483	46.6
1914	3,747	1,864	49.7
1915	4,300	2,226	51.7
1916	4,706	2,416	51.3
1917	5,568	3,113	55.9
1918	7,013	3,974	56.6
1919	9,490	6,057	63.7
1920	8,382	5,246	62.5
1921	7,796	4,714	60.4
1922	7,256	4,442	61.2
1923	7,558	4,839	64.0
1924	7,928	5,142	64.8
1925	7,099	4,378	61.6
1926	6,898	4,154	60.2
1927	6,165	3,630	58.8
1928	6,135	3,495	56.9
1929	6,119	3,327	54.3
1930	6,178	3,191	51.6
1931	5,245	2,434	46.4
1932	5,066	2,211	43.6
1933	5,540	2,476	44.6
1934	5,858	2,437	41.6
1935	6,119	2,374	38.7
1936	6,513	2,308	35.4

Note: 1. Formulated from the 1st, 2nd, and 3rd Mantetsu Jūnen-shi, p. 586, p. 680, p. 1,702, respectively.
2. Excludes the Yantai Coal Mine.

b. Employment Categories of Chinese Labour

If it is the case that the demand for a great deal of Chinese labour was created in the developmental process, in what way was it incorporated into the employment structure? Generally speaking, Chinese labour at Fushun Coal Mine was employed in accordance with three occupational ranks and categories: regular workers (later regular staff), full-time workers (later full-timers), and pitmen (later full-time labourers). Moreover, employment was to be had in either of two ways, namely, to be hired directly by the Japanese management or to be hired indirectly through Chinese contractors. The actual employment pattern of Chinese labour at Fushun Coal Mine can be broken down into the following three stages: the first, from Japanese military control to about 1911, the second from 1912 to about 1926, and the third from 1927 onward.

The category consisting of regular workers included intermediate and junior engineers and various leading skilled workers. They formed a modern labour force with "specialized skills," who were consistently employed directly by the Japanese management.[70] The regular workers were paid on the basis of "daily wages," and as shown in Table 24, their wages were 20 to 30 per cent higher than those of other workers. The terms which they received were in accordance with those received by Manchurian Railway employees of and included such benefits as company housing, seasonal bonuses, and special assistance in accordance with the relief regulations regarding regular workers. As shown in Table 25, these workers comprised about 10 per cent of the total number of Chinese workers and they were the leaders as well as the nucleus of coal mine labour.

Full-time workers (full-timers) consisted of those Chinese whose experience and skills did not reach the standard of the regular workers; they were thus held in reserve to be trained to be regular workers. There also were those who would never reach a regular standard.[71] From the end of the 1920s, however, full-timers became the predominant work force in jobs related to machinery. In view of the fact that full-time workers also comprised the mine's modern labour force, they were consistently

TABLE 24. Average Daily Wages at Fushun Coal Mine (Unit: sen)

Year	Chinese			Japanese		
	Pitmen	Full-time workers	Temporary workers	Regular workers	Full-time workers	Regular workers
1912	35.5	34.3	26.3	42.3	81.7	113
1913	35.0	34.4	28.0	42.8	79.9	114
1914	33.8	33.2	25.4	42.8	88.9	114
1915	33.7	30.4	23.2	40.9	81.8	114
1916	36.6	31.2	25.3	41.0	78.9	112

Note: From Manshū ni Okeru Kōzan Rōdōsha, p. 127.

TABLE 25. Chinese Labour at Fushun Coal Mine in Accordance with Occupational Rank and Category

	1917[1]		1930[2]		1939[3]	
	Number	%	Number	%	Number	%
Regular workers (or regular staff)	2,749	9.6	4,714	10.5	1,773	3.0
Full-time workers (or full-timers)	13,289	46.7	10,351	23.2	10,455	18.2
Coal diggers/odd-jobbers (or full-time labourers)	10,279	36.3	22,003	49.6	30,252	52.9
Contracted labour (or supplied labourers)	-	-	5,575	12.5	14,779	25.7
Temporary labourers	2,129	7.4	1,908	4.2	163	0.2
Total	28,446	100.0	44,551	100.0	57,422	100.0

Note: 1. Figures from Manshū ni Okeru Kōzan Rōdōsha [Mining labour in Manchuria], p. 231.
2. Figures from Minami Manshū Kōzan Rōdō Jijō [The conditions of mining labour in southern Manchuria], p. 17.
3. Figures from Rōmu Taisaku Kenkyū [A study on labour strategy], Vol. 1, p. 26.

hired directly by the management. There were, however, cases at the beginning when they were hired through Chinese contractors because there were quite a number of semi-experienced and semi-skilled workers in this category. In general, the wages of the full-time workers also were paid on a daily basis. As shown in Table 25, their wage standard was equivalent to that of the average pitmen. The wages of the full-time workers, however, tended to be stable, as they were paid on a daily basis. Although their treatment was inferior to that of the regular workers, they were given certain benefits in accordance with the regulations regarding full-time workers. Numerically, as shown in Table 25, their ratio to the total number of workers was high. From the 1920s, however, the ratio was halved, as this occupational category became limited to those working in jobs related to machinery.

The category of pitmen, which seems to have included allocators, putter, and so forth, had undergone a great historical change.[72] During the founding period of Fushun Coal Mine, pitmen were put under the employment of contractors, as had been the case under Russian management. As was generally seen at modern Chinese coal mines until 1911, coal extraction work was contracted to the chiefs of the Chinese coal miners, or to the so-called "Baotou," and pitmen were directly hired by such contractors.[73] The Fushun Coal Mine management, however, abolished the contracted work system in the coal extraction sector in 1912 and placed pitmen under the management's direct employment. Nevertheless, this was a quasi-direct employment system because the contractors were entrusted with the recruitment of miners and they also partially assumed the function of labour control on behalf of the management, despite the abolishment of the contracted work system.[74] Although both the contracted work system and the quasi-direct management system are referred to as the contractor system (Baotou system), they must be differentiated. This point will be discussed in detail later.

Recruitment and labour control on the basis of the contractor system was revised and curtailed from about 1927.[75] In other words, taking the progress of mechanization and the modernization of the miners into consideration, the management curtailed the function of the Baotou and

introduced the labour chief system (also called the work chief system) to extend and reinforce the direct control of the management. It was, however, difficult for the Japanese to ignore the existence of the Chinese contractors and to completely control Chinese labour themselves. In addition, the work contract system partially remained.[76] This was not only left in such areas as that of temporary work, engineering, and road construction, but also was extended due to the shortage of labour caused by the establishment of Manchukuo. Such a contract system deserves attention as the system which was preferred, and therefore adopted by Japanese management.

c. The Baotou System as a Special Employment System

In what manner was the labour force procured and managed under the above-mentioned employment pattern at Fushun Coal Mine? Prior to examining this question, the Baotou system, which is a characteristically Chinese form of employment, will be discussed in detail, because labour problems at Fushun Coal Mine were predominantly related to this system.

The Baotou system refers to a system of contracted work seen in the mining industries, the civil engineering and construction industries, and the transportation industries in China.[77] There were basically two types of Baotou systems in coal mining. The first was a system in which a Baotou received a contract to carry out coal-mining work from a manager. In general, this type prevailed in modern Chinese coal mines. The coal mine manager paid the Baotou a fixed commission in proportion to the amount of contracted work. The contractor then gathered workers, conducted the work with the help of subcontractors, and paid the workers' wages from his commission. The second type did not entail contracted work. It was a system in which a Baotou was entrusted by a manager to recruit and control labour. This type prevailed at Japanese colonial coal mines such as Fushun. According to it, the contractor, instead of the manager, took sole charge of labour management. His commission was paid not in proportion to the amount of work but in proportion to the value of the wages earned by workers under his control.[78]

Neither of these types existed at the endogenous coal mines as they were only pertinent to modern coal mines.[79] Attention should be paid to the fact that the function of this system tended to be modern, despite the pre-modernity of its structure. The second type is obviously a deviation from the first. As pointed out earlier, although the first type of Baotou system based upon contracted work, in fact, existed for coal extraction at Fushun Coal Mine, the second type, aimed at labour management, was introduced in 1912 because of the abolishment of the first type. In this sence, therefore, the first type will be referred to as the first Baotou system and the second type as the second Baotou system. The Baotou system in China is intrinsically identical to the contractor systems existent in the coal-mining industry in other countries. As was already discussed in another paper, the same two types of Baotou systems existed in the Japanese foreman or the bunkhouse system.[89] In this sense, therefore, the Chinese Baotou system is not unique to China.

The uniqueness of the Chinese contractor system lies in the fact that the first Baotou system based upon contracted work was predominant, rather than the second type, which was prevalent in Japan, and that the system existed widely, even in the stage when the modernization of coal mining had progressed to some extent. The general reasons for the need of such a system were as follows: First, it was necessary for the managers to entrust the actual coal mining to the coal miners and foremen who were experienced in the business since the managers were not well-versed in the coal extraction operation. Second, because of the difficulties entailed in the control of diffused labour which came about as a result of the modernization of coal extraction, labour control had to be entrusted to contractors who were able to command enough authority. Third, the insufficient formation of a free coal mine labour market made it so difficult to recruit and secure a labour force that it was necessary to rely upon competent contractors for this purpose.

In addition to the above-mentioned general reasons for having a contractor system in China, there were other reasons which contributed to the longevity of the system. First, the establishment of a free coal-mining labour market was delayed remarkably because foreign control suppressed

the development of capitalism in China, causing the disintegration of the peasantry to be delayed. In China in particular great regional differences in language and customs existed. There was a guild type of regional association called the Bang organization, and the procurement of labour had to go through this organization.[81] The Baotou system was based upon the Bang organization, at the apex of which stood the contractor. Second, since most of the modern coal mines happened to be colonial coal mines, their foreign managers had no choice but to rely upon contractors since they could not easily and directly gather and manage Chinese labourers. Furthermore, labour management by the contractors was financially more feasible than having it placed directly under the control of management.

It was not, however, as if the contractor was solely in charge of all coal-mining labour. The management directly controlled those mining workers who were engaged in such mechanized sectors as hoisting, transportation in the gallery, and drainage. Though insufficient, the labour market for the mechanized sector of coal mining was established at an early stage. The contractor system, in consequence, was dominant in sectors such as coal extraction and transportation at the coal face which were slow to be mechanized. The Baotou system brought various abuses, which generally were part of the contract system, such as random excavation and the severe control and exploitation of labour. The more power the Baotou had, the less influence could the management exert upon him to accomplish its own intentions. Coal mine investors thus tried to curtail the function of the Baotou. The mechanization of the coal extraction sector meant that coal mine capital could further its direct control over the labourers.

As far as the Baotou system at Fushun Coal Mine is concerned,[82] the first Baotou system based upon contracted work prevailed in coal extraction up to 1911. As previously pointed out, after several years of experience the management revised the system to the second Baotou system in 1912. In Japan the foreman system based upon contracted work hardly existed at coal mines run by large enterprises. The contracted work system was obviously not suitable for the management of large enterprises. In view

of the Japanese experience, the management at Fushun decided to introduce the second Baotou system, as it was capable of directly controlling the area of coal extraction to some extent. The reason the management did not put coal extraction labour under its direct control was naturally due to the aforementioned circumstances. In other words, first, because Fushun Coal Mine was a colonial coal mine, the management had to rely upon the Baotou since it was difficult for the Japanese managers to directly control, recruit, and manage Chinese labour. Second, due to the insufficient formation of the labour market for workers engaged in coal extraction, it was difficult for management to secure labour directly. Third, due to delayed mechanization in this sector, labour management was so difficult that it required the mediating control of the contractor. Thus, from 1912 to about 1927 the second Baotou system existed mainly in the sector of coal extraction as well as in other sectors at Fushun. Although there was an attempt in the interim to put labour in the coal extraction sector under the direct control of management, as was done with labour engaged in mechanical jobs, this was not successful.[82]

The actual function of the second Baotou system at Fushun Coal Mine will be discussed in detail later. However, the management's policy concerning the contractor system in general will be discussed here. In 1912, the management defined the nature of the second Baotou system in its "Regulations Regarding Coal Extraction Coolies Under a Baotou."[84] According to the regulations, a Baotou with more than one hundred coal extraction coolies was called a great Baotou, under whom were petty Baotou each with about 50 coolies. The appointment of a great Baotou by the management was made on the basis of "having the competence and leadership to supervise a large number of coal extraction coolies as well as being loyal to the coal mine and devoted to the extraction work." The management appointed petty Bautou on the basis of recommendations made by a great Baotou. The number of workers was not prescribed, as the management entrusted the right of dismissal to great and petty Baotou alike. Concerning the salaries of the contractors, a great Baotou was paid on a monthly basis 35/1000 of the total wages of the coolies under his control. A petty Baotou received a basic monthly salary of 5/100 of the total wages of the coolies under his control and an addi-

tional 2/100 was allotted every month in accordance with his performance.

As shown in Table 26, there were originally 13 great Baotou with an average number of 796 coolies at Fushun Coal Mine. Due to an increase in the number of miners, the number of great Baotou also increased, for there were 19 in 1926 and 23 in 1930. In 1931, however, due to a labour policy revision, the number was cut in half. Although a great Baotou on the average controlled 600 to 700 coolies, the number varied according to different great Baotou. As shown in Table 27, influential great Baotou controlled more than 1,000 coolies while less influential ones controlled about 170 coolies.

As shown in Table 28, the actual salaries of the contractors in 1926 reveals that a great Baotou received an average monthly income of ¥249, or 9 yen 96 sen per day. A petty Baotou received ¥77 yen monthly, or 3 yen 10 sen daily. As shown in Table 29, a great Baotou's income was about three times that of a petty Baotou's, and it was far more than the average monthly income of 175 yen received by Japanese office employees at Fushun Coal Mine. The petty Baotou's income was equivalent to that

TABLE 26. Number of Baotou and Their Coolies at Fushun Coal Mine

Year	Number of great Baotou	Number of petty Baotou	Number of coolies	Average number of coolies per great Baotou	Average number of coolies per petty Baotou
1918	13	-	10,351	796	-
1926	19	121	10,986	578	90
1930	23	234	17,848	776	76
1931	13	125	8,341	641	66
1935	10	72	-	-	-
1939	9	60	-	-	-

Note: Formulated from Manshū ni Okeru Kōzan Rōdōsha, pp. 232-233; Mantetsu Dainiji Jūnen-shi, pp. 584-585; Minami Manshū Kōzan Rōdō Jijō, pp. 34-35; Bujun Tankō Tokuhon, p. 433.

TABLE 27. Salaries of Baotou in 1926 (Unit: yen)

	Great Baotou	Number of coolies	Annual income	Monthly income	Daily income	Number of petty Baotou	Average annual income per petty Baotou	Average monthly income per petty Baotou	Average daily income per petty Baotou
Ōyama Pit	A	890	3,605	300	12.01	8	973	81	3.24
	B	635	5,141	428	17.13	10	936	78	3.12
	C	688	5,036	419	16.78	8	1,309	109	4.36
	D	751	5,038	419	16.79	8	1,358	113	4.52
Tōgō Pit	E	633	2,825	235	9.41	5	1,291	107	4.30
	F	632	2,573	214	8.57	5	1,176	98	3.90
Yanbaibao Pit	G	1,037	4,421	368	14.73	9	1,121	93	3.73
	H	559	2,376	198	7.92	5	1,086	90	3.62
Laohutai Pit	I	611	4,142	345	13.80	8	1,139	94	3.79
	J	830	2,977	248	9.92	7	982	81	3.27
Wandawu Pit	K	706	2,734	227	9.11	6	1,068	89	3.56
	L	642	2,845	237	9.48	5	1,249	104	4.16
Longfeng Pit	M	570	3,104	258	10.34	8	553	46	1.84
	N	392	2,655	221	8.85	7	509	42	1.69
Hsintun Pit	O	299	1,721	143	5.73	4	695	57	2.31
	P	445	2,543	211	8.47	6	744	62	2.48
	Q	312	1,302	108	4.46	6	490	40	1.63
Talian Pit	R	175	740	61	2.46	3	455	37	1.51
	S	179	1,036	86	3.45	3	569	37	1.89
Total	19	10,986				121			

Note: 1. Formulated from Dainiji Mantetsu Jūnen-shi, pp. 584-585. 2. A monthly income is 1/12 of an annual income, and a daily income is calculated on the basis of dividing the monthly income by 25 working days. 3. Due to the fact that only the total annual income for each great Baotou was available, the annual income for petty Baotou was calculated by dividing the great Baotou's annual income by the number of petty Baotou.

TABLE 28. Average Salary per Baotou (Unit: yen)

	Great Baotou	Petty Baotou
Annual income	2,990	931
Monthly income	249	77
Daily income	9.96	3.10
Average number of coolies under control	578	90

Note: Calculated on the basis of the previous table.

TABLE 29. Wages of Senior Workers at Fushun Coal Mine in 1926 (Unit: yen)

	Monthly salary	Daily wage
Japanese office employees	175.07	7.00
Japanese regular workers	86.32	3.45
Chinese regular workers	16.91	.67

Note: Formulated from Mantetsu Dainiji Jūnen-shi, p. 681. The daily wage was calculated by dividing the monthly salary by 25 days.

of a Japanese skilled worker and was about three times that of a Chinese regular worker's or four times that of a general worker's. The high income of the contractor aptly reveals the unique function fulfilled by the system of contractors. The contractors in the second Baotou system were intrinsically synonymous with intermediate and junior managerial staff members hired by coal mine management.[85] Due to their own ability to control labour, they were evaluated so highly by the management that they were remunerated accordingly. In addition to their salaries, contractors received commissions from provision shops and from management at the time of labour recruitment. It was not, however, as if all this became their cash income. Their unique function was based upon their specific relationship to the labour under their control. To emphasize that the relationship was based upon money, contractors gave farewell monetary gifts to miners returning home. They also assumed the role of patriarch by paying the travel expenses of sick or injured miners going home as well as bearing other welfare expenses. Moreover, they had to bear the debts made by free-spending miners as well as the fines incurred by those miners who violated regulations.[86]

At Fushun Coal Mine, the contractors were under far stricter managerial supervision; thus their independence was considerably less than that which was seen at other coal mines. Despite the irrational and premodern nature of the Baotou system, its efficiency was indispensable for the control of Chinese labour under Japanese management.[87] With the great revision of labour policy in 1931, however, the contractor system was curtailed and its function diminished.[88] Moreover, the management introduced the labour chief system, or the work chief system, to include the Baotou as members of the intermediate and junior managerial staff. The chief's function was limited to work supervision alone. The Baotou system at Fushun in the second and third decades of this century was a powerful recruitment system for coal extraction labour. Upon completing its historic function, however, the system diminished and then declined in the 1930s.

2. The Development of Chinese Labour Management

a. Chinese Labour Procurement

The procurement and management of Chinese labour was an extremely important task at Fushun Coal Mine, which developed rapidly despite a delay in the overall development of capitalism as well as the insufficient development of a coal-mining labour market. In what manner did the management procure Chinese labour?

A labour force was generally procured at a labour market. A coal mine labour market, however, was not necessarily sufficiently formed in China, especially prior to the 1930s. The coal mine management and the Japanese government thus actively trained the necessary intermediate and junior engineering staff members. In 1912, Manchurian Railway founded Fushun Handy Mining School, which was reorganized and developed into Fushun Mining School in 1923. The training period at the latter was a year for a preparatory course and two and a half years for a regular course. Students entering this school had to be higher elementary school graduates. Between 1922 and 1926 there were 18 graduates of this school, and in 1928 48 students were enrolled.[89] Although the number was small, the management itself thus trained Chinese to be intermediate and junior engineers.

Furthermore, in Manchuria, the Japanese government founded a technical school and a college with mining and mechanical departments to train engineers for colonial coal mines. In 1910, a four-year college with a mining department, called Lushun Engineering Institute, was founded for the joint education of Chinese and Japanese. This college sent out about 600 graduates until it was closed down in 1926. Some of the Chinese graduates must have been employed at Fushun. Apart from the above, in 1922 Lushun Engineering College was newly founded, and a one-year preparatory course was opened specifically for the Chinese. In 1929 there were 31 Chinese students in the preparatory course and 16 Chinese students in the regular course.[90] In addition, the government of the Republic

founded the University of Tungbei in 1939 and established a Mining and Metallurgy Section in its Engineering Department to train Chinese engineers.[91]

The establishment of Manchukuo in 1932 triggered a developmental boom in Manchuria and caused a shortage of engineers. The government of Manchukuo, aiming at the training of more Chinese engineers, increased technical schools and colleges and sent students to study in Japan.[92] In 1936, an Attatched Provisional Engineering Staff Training Center was opened at Lushun Engineering College. Its training period was one year, and 75 Chinese students were enrolled in the mining section. In 1938, Ritsumeikan's Nisshin High School, which offered a two-year training course, was founded. There were 15 Chinese students enrolled in the mining and metallurgy section. In addition, Harbin Industrial College was founded, and in 1939 sent out 16 Chinese graduates from its mining and metallurgy section. Such four-year colleges as Xinjing Engineering and Mining School and Fengtian Engineering School, which had an enrollment of 70 students per year, also were established. As seen above, the necessary Chinese engineers for Fushun Coal Mine were gradually nurtured by Fushun Coal Mine management itself as well as with the help of the government.

A Chinese labour force including engineering staff members and skilled workers was generally procured from a labour market. However, due to the insufficient development of a coal-mining labour market in China and to the tendency of a general shortage of labour up to the 1920s, it was difficult to secure a labour force. The procurement of modern skilled mining workers was particularly difficult. Nevertheless, Fushun Coal Mine, which triggered the extension of a demand for labour, was active in procuring the massive labour force which the mine required. The two methods of labour procurement at Fushun Coal Mine were local employment and recruitment employment.[93] Reflecting the formation of the coal mine labour market, there were two types within the category of local employment. One type was for the Chinese labourer who moved into Fushun of his own volition to be hired upon the completion of the employment procedure. The other type mainly pertained to a labourer under the contractor system who moved from the control of one great Baotou at a certain pit to another

great Bautou at another pit. Recruitment employment was a method of employing a labourer who was hired by recruitment agents sent out to various regions. This method consisted of two types, namely, labourers recruited by the temporary recruitment staff and labourers recruited though recruitment agents established in the countryside. Moreover, there were private recruitment agents controlled by great Baotou as well as recruitment agents under the direct management of the mine. The former type, however, existed only between 1916 and 1919 and agents under the management's direct control were predominant.

Irrespective of the recruitment methods applied, various active means had to be implemented to procure and secure a massive labour force. The first method was to provide the labourers with better wages, welfare, and health facilities than that which was provided by other mines. This could help not only in the procurement of labour but it also would bring psychological stability to the labourers at the mine. In fact, the wages at Fushun Coal Mine are said to have been higher than those at other coal mines in the countryside. As shown in Table 30, for example, the wages paid by Fushun Coal Mine were more than double those paid by Liuchuan Coal Mine in Shantung Province. In addition, a welfare and health policy which was far more advantageous than that provided by patriarchal contractors at other provincial coal mines was offered by the Fushun Coal Mine management. To secure a quality work force, labourers who came to the mine of their own volition and who served for a certain duration were given various benefits.[94] The procurement of a modern labour force engaged in mechanical jobs appears to have been done in this manner to some extent. On the other hand, when the labour market was not sufficiently formed, it was extremely difficult to secure a force for such work as coal extraction, which required hard labour, by simply bettering wages and treatment. The management, therefore, took the second measure of procurement, which was to procure labour through the active mobilization of contractors.

A labour force was not recruited from outside as operations at Fushun Coal Mine were getting under way, but was hired locally as labourers came spontaneously to the mine. However, as increased development led

TABLE 30. Comparative Wages in 1917 (Unit: sen)

	Fushun Coal Mine		Liuchuan Coal Mine	
Faceman	Average	57	Average	23
	Per ton	50	Per ton	37
Shifter	Average	49	Average	19

Note: From Manshū ni Okeru Kōzan Rōdōsha, p. 38.

TABLE 31. Comparative Ratio of Place of Origin of the Fushun Coal Mine Workers (%)

	1917	1930			Total
	Pitmen	Pitmen	Full-timers	Odd-jobbers	
Shantung Province	63.5	65.0	46.0	61.0	57.0
Hebei Province	20.3	22.0	27.0	24.0	25.0
Manchuria	16.2	4.0	23.0	8.0	12.0
Others	-	9.0	4.0	7.0	5.0
Total	100.0	100.0	100.0	100.0	100.0

Note: The figures for 1917 from Manshū ni Okeru Kōzan Rōdōsha, p. 75, and the figures for 1930 from Minami Manshū Kōzan Rōdō Jijō, p. 30.

to an increased labour demand, the spontaneous influx was no longer sufficient and the management had to actively recruit labourers.[95] Thus, starting in 1912, the management began to establish recruitment agencies called Labour Recruitment Offices. One was established in Shantung Province, from where most of the Fushun Coal Mine workers traditionally came prior to the establishment of the Japanese management. Another was established in Hebei Province, where much coal-mining labour was accumulated due to the existence of a number of modern coal mines such as Kailuang, as well as the many endogenous coal mines in the vicinity. The management sent out Japanese employees so that they could have Chinese contractors and skilled miners recruit skilled, unskilled, and non-skilled labourers. As shown in Table 31, Fushun Coal Mine labourers came predominantly from Shantung and Hebei provinces. Contractors mainly took charge of labour recruitment and were paid a commission in accordance with their performance. Furthermore, as a means of securing the recruited labour, a bounty was paid to the contractor when the recruited labour worked for more than 30 working days. The contractor, however, had to pay a fine should the recruited labour escape within 30 working days. Thus a total of 11 labour recruitment offices were established by 1920. There were five in Shantung Province, two in Hebei, two in the Rehe region, and two in the home province of Fengtian. As it later became easier to secure labour, the number of labour recruitment offices was reduced; the Labour Recruitment Office system came to be abolished in 1931.[96] The recruitment of labour subsequently was pursued directly by the management whenever necessary.

During this period, the retention rate of labour recruited by contractors was extremely low, which reflected the quality of labour available at that time. For example, as shown in Table 32, while the target was to recruit 2,531 workers in 1917, the actual number recruited was 1,743 (a sufficiency rate of 69 per cent), of which only 749 worked for at least 30 days. The majority of labourers left the mine in less than a month. The labourers in question here worked in the coal extraction sector, where, as noted above, the settlement rate was extremely low; these labourers very much lacked the quality of a modern labour force.

TABLE 32. Settlement Rate of Recruited Labour

	According to locality	According to Baotou
Labourers to be recruited	2,531	1,156
Actual number recruited	1,743	1,104
Sufficiency rate (%)	69	95
Number who worked more than 30 days	749	431
Retention Rate (%)	43	39

Note: Formulated from Manshū ni Okeru Kōzan Rōdōsha, pp. 73-74.

TABLE 33. Methods by Which Chinese Pitmen Were Employed at Fushun Coal Mine

Year	Recruited		Sought employment	Transferred within the mine	Total number employed	
	Number	%	%	%	Number	%
1912	5,216	16.9	24.1	59.0	30,752	100
1913	13,995	40.2	6.9	52.9	34,789	100
1914	3,042	9.0	33.3	57.6	33,550	100
1915	2,455	8.5	24.7	66.8	28,959	100
1916	4,258	14.9	16.6	68.5	28,533	100
1917	11,412	32.8	29.5	46.7	34,897	100
1918	15,024	35.6	64.4		42,087	100
1919	16,310	32.9	67.1		49,425	100
1920	15,190	25.8	74.2		58,809	100
1921	1,283	4.1	95.9		30,779	100
1922	1,240	4.6	95.4		26,556	100
1923	4,105	10.9	89.1		37,435	100
1924	2,252	6.6	93.4		33,807	100
1925	1,834	6.8	93.2		26,957	100
1926	5,430	17.1	82.9		31,595	100

Note: Formulated from Manshū ni Okeru Kōzan Rōdōsha, pp. 80-84 and the 3rd Mantetsu Jūnen-shi, p. 586.

As shown in Table 33, although the management recruited a large number of workers from 1912 onward in conjunction with the development of the mine, recruitment was drastically curtailed due to a stable labour supply after the post-World War I depression. This denotes that the labour procurement method in the 1920s shifted more to that of labourers who came to the mine of their own accord. It does not mean, however, that they had the quality of a modern labour force or that they contributed to the stability of coal mine labour. Table 34 shows the overall mobility rate of coal mine labour, including the pitmen. The mobility was extremely high until about 1927. In other words, four to five times the number of registered labourers were employed and then retired. This abnormally high mobility rate was partially caused by the modern factor of labourers generally seeking higher wages, better working conditions, and mobility to acquire further skills. In addition to this factor, the high mobility rate was, first of all, caused by the fact that most of those Fushun Coal Mine labourers engaged in coal extraction were not of sufficient quality for a modern large coal mine. In other words, they hardly had any work experience at a modern coal mine. Thus they could not easily adjust to the strict timetable and security regulations (imposed upon them due to the possible dangers inherent in mine labour) as well as to the gigantic mechanized system existent at the Fushun Coal Mine. Although they sought employment because of high wages, they thus left after a short period.[97]

The second reason for the exceptionally high mobility rate of labour was because most of the labourers were working away from home and could not totally divorce themselves from the communal society to be found in their home provinces. Semi-agrarian migrant labour seldom worked at a mine for a long period of time, as it would go home during the busy farming season. There also were many who would return home for such occasions as the New Year, seasonal festivals, and other local rituals. Since many of these came back to be rehired, the mobility rate was even higher.[98] The third noteworthy point is that mobility from one pit to another in the same coal mine was frequent. As shown in Table 33, as far as the data for the second decade of this century alone were concerned, 50 to 60 per cent of newly hired coal extraction labourers were simply transferring

TABLE 34. Mobility Rate of Chinese Workers at Fushun Coal Mine

Year	Pitmen		Full-timers (former full-time labourers)	
	Employment rate	Retirement rate	Employment rate	Retirement rate
1912	4.2	4.0	-	-
1913	3.9	3.7	-	-
1914	5.0	5.3	-	-
1915	3.4	3.2	-	-
1916	4.6	4.9	-	-
1917	3.5	3.2	-	-
1918	3.5	3.3	-	-
1919	4.3	4.4	-	-
1920	4.7	4.6	-	-
1921	3.7	4.2	-	-
1922	3.1	3.1	-	-
1923	3.5	3.4	-	-
1924	3.0	2.9	-	-
1925	2.6	2.7	-	-
1926	-	-	-	-
1927	3.1	3.1	0.8	1.0
1928	1.7	1.9	0.6	0.5
1929	1.4	1.4	0.7	0.6
1930	1.2	1.7	0.4	0.4
1931	0.7	1.1	0.3	0.2
1932	1.0	0.7	0.3	0.3
1933	1.2	1.0	0.5	0.3
1934	1.0	0.9	0.3	0.2
1935	0.9	0.8	0.2	0.1
1936	0.8	0.6	0.2	0.2

Note: The above was calculated on the basis of the number employed and the number retired over the total number of workers registered at the end of each year. Data formulated from Manshū ni Okeru Kōzan Rōdōsha, pp. 80-84. The 2nd and the 3rd Mantetsu Jūnen-shi, p. 586 and p. 1,727 respectively.

TABLE 35. Number of Work Years of Chinese Labour at Fushun Coal Mine

	Pitmen			Full-timer			Odd-jobber		
	1928	1929	1930	1928	1929	1930	1928	1929	1930
Less than 1 year	71.3	91.4	45.2	40.7	48.5	37.9	70.1	63.1	60.3
Less than 2 years	19.6	14.8	26.8	23.3	17.8	27.6	14.4	22.7	21.8
Less than 3 years	5.4	8.8	13.3	12.0	12.2	10.8	9.3	6.3	7.8
Less than 4 years	1.8	2.7	9.4	7.6	6.4	7.9	3.1	4.6	4.0
Less than 5 years	0.9	1.1	3.1	8.6	4.2	4.6	2.2	1.6	3.2
Less than 6 years	0.4	0.7	1.4	3.0	5.4	3.0	0.4	1.2	1.2
Less than 7 years	0.2	0.3	0.8	1.2	1.9	3.9	0.2	0.3	0.6
Less than 8 years	0.1	0.1	0.4	1.0	0.9	1.5	-	0.1	0.4
Less than 9 years	-	-	0.1	1.0	0.7	0.8	-	-	0.3
Less than 10 years	-	-	-	1.0	0.7	0.5	-	-	0.3
Less than 15 years	-	-	-	0.5	0.9	1.2	-	-	0.2
Less than 20 years	-	-	-	-	-	-	-	-	-
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Formulated from Minami Manshū Kōzan Rōdō Jijō, p. 54.

from one pit to another. This transfer was due to several reasons, such as competition between great Baotou over labourers and labourers seeking better working conditions. Apart from economic reasons, they also moved to other pits to be where their relatives or friends were working.[99] Be that as it may, this intra-mine mobility, which caused employment instability and at times wage increases, was prohibited by the management. In 1912, the authorities established the Central Labour Recruitment Office and prohibited independent and spontaneous recruitment by individual pits. In 1924, to further reduce intra-mine mobility, a fingerprint system was adopted.[100] This system, however, does not appear to have necessarily reduced intra-mine mobility.

As seen above, the high mobility rate in general brought instability to the management. The managerial authorities, therefore, took measures to modernize the labour force through the mechanization of the coal extraction sector so that the miners would be more reliable. This was the third active means undertaken by the management to procure and secure a massive labour force. As was mentioned already, progress in the mechanization of the coal extraction sector lessened the demand for labour and reduced the necessity for labour recruitment. Consequently, labour procurement was satisfied by the spontaneous influx of workers coming out of the labour market. The mine authorities imposed strict employment conditions to improve the quality of labour, and bettered the wages and other work terms to satisfy the labourers.[101] The outcome of these policies became apparent at the end of the 1920s, and as shown in Table 34 the mobility rate declined rapidly. In the 1930s, the mobility rate of pitmen became a little more than one and that of full-timers was reduced to one-half the rate of pitmen's, or to one-third. This factor, moreover, contributed to longer work years. As shown in Table 35, those pitmen who worked for more than two years accounted for 28 per cent; this reveals that experienced pitmen were settling in. The number of work years for full-timers engaged in mechanical jobs was much longer than those for pitmen. In the 1930s it thus finally became possible for Fushun Coal Mine to procure and secure a stable work force. This aspect will be discussed in detail when labour management's development is examined.

b. The Development of Labour Management

i. The Development of Direct Labour Management by Coal Mine Owners

Under what type of labour management did the Chinese labour work? Regular workers and full-timers who were directly employed by the coal mine's owners naturally worked under a unified system of labour management, that is, they worked according to the system found in a Japanese office. The main issue here is labour management regarding labourers in the coal extraction sector. The coal extraction labourers under the contractor system were doubly managed in the sense that they were placed under the direct management of the mine's owners as well as under the independent management of the contractors.[102] The labour management policies of the owners, however, were more dominant.

As was the case with Fushun Coal Mine's employment policy, its labour management policy also went through three stages. In the first, which lasted until about 1911, the policy simply followed the course of events. In the second, between 1912 and about 1926, a policy unique to Fushun Coal Mine was developed and tried. From 1927 onward, labour management entered its third stage. This was due to labour management's conversion from the second Baotou system to an extremely modern one. The development of labour management in the second and third stages will be examined here.

The basic trait of the second stage was the introduction of the second Baotou system after the abolishment of the contracted work system, mainly in the coal extraction sector, in 1911. Moreover, taking Chinese labour conditions into consideration, mine owners developed the kind of labour management suitable to a modern mine. The first and foremost objective of direct labour management by the owners at this stage was, as already seen, to procure and secure a labour force of good quality. Therefore, mine owners on the one hand took a series of measures to improve work conditions for the miners to induce the spontaneous influx of quality labour. On the other hand, regarding labour recruitment by contractors, mine owners bore the recruitment expenses and paid a certain bounty when

quality labour was recruited. Even though the owners still relied upon the contractor system, they could work toward their second objective: to improve labour quality independently, to maintain a quality work-force, and to enhance productivity with the use of an organized and controlled work-force.[103] As pointed out already, Chinese coal mine labourers were not of satisfactory quality for a modern coal mine such as Fushun. Most of them were not accustomed to the strict work regulations demanded of them by a modern coal mine. Furthermore, their work morale was low because of their poor living standard, and their settlement rate was extremely low. Therefore, the management established the Office for Foreign Employed Chinese Labour at each pit. It stipulated rigid work and safety regulations and itself organized and supervised labour. Japanese managerial staff members inspected the miners at times as they went in and out of the pit to prevent them from bringing in such prohibited items as cigarettes and matches. The Japanese staff members also inspected the mine labourers' tools and coal extraction permits. Officers were sent around to supervise work in the pit. Those labourers who violated the regulations were fined. The contractor in charge also was fined, for he was held jointly responsible. To enhance productivity, the management guaranteed the wages for newly hired inexperienced labourers for a certain period so that they could acquire some skills. Those miners who independently came to the mine to be hired were given travel expenses after completing a period of work; they also were given some wage increase.

Nevertheless, what should be noted here is that in the second stage the modern labour management policy initially pursued by the coal mine authorities was not effective. In general, coal mine labour during this stage did no more than to earn its minimum living expenses. Due to a high mobility rate skills were not accumulated; thus the miners' efficiency was remarkably low. Although the management decided to give out increased wages and a bounty to enhance the efficiency of coal extraction work, certain data of the Manchurian Railway in the second decade of this century pointed out the following:

> Their ideas are immature and their personality tends to become idle as they become familiar. Thus there is no other way but to revise their personality.[104]

Consequently, in 1917 for example, the daily output per miner, including the surface and pit work, was on the average 0.35 ton,[105] which was about one quarter less than that of a miner in Japan. These were the very circumstances which necessitated the kind of labour control to be found in the contractor system.

It was not until the third stage, which started in 1927, that a direct system of modern labour management by mine owners became effective, due to the following reasons: The formation of a labour market became quite adequate. The relatively decreased labour demand, which resulted from further mechanization in the coal extraction sector, made it possible to find quality workers. In 1927 the management revised its recruitment regulations, as well as the terms under which the affairs of coal extraction labour were to be placed. The terms for recruitment agents were improved, and the management gave more favourable treatment when quality labour was procured. On the other hand, when the recruitment agents hired low-quality labor, they were made to pay compensation. Furthermore, the management examined the aptitude of the applicants very carefully and screened then strictly at the time of hiring. As far as intra-mine mobility was concerned, the management put forth a strict policy that no one in this category would be hired. To get labour to settle in, the management improved wages and the health and welfare system.[106] These changes contributed to the weakening of the contractor system.

In other words, as of 1927, the management revised the payment system so that the wages were paid directly to individual workers instead of being paid indirectly through contractors. Moreover, the wage rate was made more rational, and those who had worked for the mine a long time were paid bonuses and compensation for illness. In 1930, shops which used to be run freely by contractors were put under the direct management of the coal mine. Although contractors remained in charge of shops, the coal mine designated fixed prices so that outrageous profits could not be enjoyed by the contractors. Furthermore, in the same year, the system by which contractors would make loans to labourers was abolished, and the management implemented a direct assistance system. Housing also was improved, and labourers with families could live in company-rented

quarters.[107] Such steps undertaken by the coal mine owners as a result of modern labour management policy contributed greatly to the betterment of Chinese labour quality in the 1930s. As pointed out already, not only did the mobility rate decline drastically but the length of service also increased. As shown in Table 36, the number of workers with families rose. An increase in their work rate is shown in Table 37, and as is shown in Table 38, their productivity was greatly enhanced.

TABLE 36. Composition of Chinese Workers with Families

Year	Number	% of the total
1930	3,413	10.4
1931	2,781	11.5
1932	2,735	15.7
1933	2,969	15.4
1934	3,400	16.6
1935	3,583	16.6
1936	5,364	22.6

Note: Formulated from Mantetsu Daisanji Jūnen-shi, Vol. 2, p. 1,731. The total number excludes those who were under the contracted work system.

TABLE 37. Work Rate of Pitmen

Year	%	Year	%
1927	67	1932	74
1928	67	1933	71
1929	69	1934	70
1930	70	1935	74
1931	72	1936	74

Note: From Mantetsu Daisanji Jūnen-shi, p. 1,724

TABLE 38. Productivity at Fushun Coal Mine (Productivity per Miner)

Year	Daily output (tons)	Year	Daily output (tons)
1927	0.51	1932	0.68
1928	0.59	1933	0.70
1929	0.56	1934	0.74
1930	0.72	1935	0.67
1931	0.76	1936	0.60

Note: The calculation method is as follows: Annual output divided by total number of Chinese labourers divided by 350 days. Moreover, those who are under the contracted labour system are not included in the total number, which is inclusive of labour engaged other than in the mine. However, the value to the aggregate is not significant.

ii. The Development of Independent Labour Management According to the Contractor System

In a modern coal mine, it was never the case whereby a contractor was entrusted with the entire management of labour under his control. Labour management under the contractor system was of a dual nature, especially at Fushun Coal Mine, where the system existed in a supplementary form to the direct management of the coal mine owners. As was seen already, inadequacy of direct management necessitated reliance upon the specific control exerted by the contractors in the second stage.

As stated, the contractor's first function in relation to labour management was to recruit labour. The second function was to actually organize, conduct, and supervise the work and to maintain and enhance productivity under the system of direct labour management.[108] The contractor organized his men into one group of hewers and another group of pushers, and assigned them to a coal face specified by the management. He therefore supervised the labourers to ensure that the work regulations set forth by the mine owners were kept and that any violations of the regulations were prevented. In addition, he kept track of the work done and managed their wages. In view of the fact that the contractor's income depended

upon the total wages earned by his men, he was eager to promote and supervise their work. Moreover, the contractor appointed a skilled subordinate to train newly recruited and unskilled labourers. The contractor system thus functioned to provide technical training for the miners. This aspect should not be ignored, because on the basis of language and racial sentiment it was very difficult for the Japanese to teach skills to Chinese labour.

The third specific function of the contractor, which was based upon the Bang relationship, was to control the entire life-style of the miner and to aim at his settling in.[109] The contractor made his men live in quarters provided by the management and he controlled their lives. He provided his men with board and operated sundry goods shops where credit was offered to the miners. The labourers were subjugated to the contractor who advanced their wages, and he thus tied his men to the coal mine. He watched their daily lives so as to prevent them from running away or from being scouted by a recruitment agent from another coal mine. The contractor received the wages for his men in a lump sum and paid them individually after deducting such debts as credit sales, fines, and other expenses. He also extended paternalistic charity-oriented assistance and relief. At times, he exercised violent sanctions upon rebellious or idle labourers. The main point of the contractor's specific function was that he supplemented all the aspects of control which could not be exercised by the management.

In the third stage of the labour management policy, which started in 1927, the functions of the contractor were drastically reduced and weakened. Due to easier labour procurement and improved labour quality, the need for specific labour management by contractors was to some extent lessened; thus direct labour management by coal mine owners was strengthened.

Labour procurement and management at Fushun Coal Mine, therefore, met with various difficulties because of the overall delay in the development of capitalism, the insufficient formation of the labour market, and a sudden development in labour demand. Despite these difficulties, however, the problems entailed in labour procurement and management can be said to have been overcome.

V. A HISTORICAL MEANING OF THE FUSHUN COAL MINE DEVELOPMENT

This paper has been dealing with the developmental process of Fushun Coal Mine with Japanese capital in China and the manner in which Chinese labour was procured and managed. Various questions have been raised, and several of the more significant issues will be discussed here prior to concluding this paper.

The first subject pertains to the fact that Japan came to dominate Chinese coal mining as a result of the development of Fushun Coal Mine. This Japanese colonial coal mine established its monopolistic position, and thus the modernization of Chinese coal mining not only stagnated but also its development by native capital was suppressed. The extensive existence of endogenous coal mines, in fact, was nothing but an adjuster for the colonial coal mines to maintain stability in a fluctuating economy.[110] On the contrary, the development and modernization of colonial coal mines indicated that Chinese coal mining would have been modernized sufficiently under certain conditions had it not been for the control of the colonial powers.[111] These conditions would have involved the following: establishment of an independent native government, concentration of capital, introduction of advanced technology on the basis of endogenous technology training of both Chinese engineers and a modern labour force, and maximum creation of self-sufficient capitalistic reproductive industries other than coal mining. Unfortunately, however, such conditions could not be created in China, not only because of the strength of the colonial powers but also because of the corrupt Ch'ing Dynasty. Moreover, a revolutionary government which would overtake the Ch'ing Dynasty and create such conditions never emerged. Although the circumstances were very different than the Japanese case, this aspect clearly reveals that the government's leadership and self-sufficiency is

cardinal for the modernization of a late-comer.

The second subject pertains to the fact that the modernization process of Fushun Coal Mine zigzagged and was thus similar to the modernization process of Japanese coal mining, which also was not a unilinear process. The first reason for this was that Japanese technology was not necessarily sufficient for the development of Fushun Coal Mine. In other words, the modernization of Fushun was pursued not only through the transfer of technology accumulated in Japan but also through the mastery of advanced technology transferred from the West. Second, it took a certain period of time for the Japanese engineers to fully understand the special conditions of the Fushun coal field. Furthermore, a long period was required for them to master advanced technology and to transform it to suit the special conditions which existed. The modernization of Fushun Coal Mine, therefore, from a sub-standard to a high-standard mine, was not achieved overnight; instead, it was modernized gradually by pursuing and developing its own independent technology.

The third subject to be discussed relates to a discovery of the reason why Fushun Coal Mine attained exceptional modernization in China. As shown in Table 39, foreign capitalists in general were not keen on the development of modern coal mines which necessitated investing huge sums of fixed capital. This was because great political and security problems were anticipated, owing to the location of such coal mines outside the settlement. Moreover, due to the high ratio of fixed funds, the turnover rate was low and the foreign capitalists could not expect the quick return which could be had with light industry.[112] Consequently, in the case of another large colonial coal mine, Kailuang Coal Mine, the amount invested was less than that at Fushun Coal Mine and its standard of development was lower.[113] Although modernization at Kailuang Coal Mine was pursued through the investment of a huge sum of fixed capital, the capitalists were not keen on the modernization of coal extraction technology. The latter was not done to save further investment from going into fixed capital. Thus Kailuang Coal Mine's development was of an easy-going and exploitative nature. In other words, the extraction method used was a chamber method which was generally called a "cave-in" extraction method.

TABLE 39. Foreign Investment According to Industries in China in 1931 (Unit: US$ million)

	Japan		England	USSR	USA
Mining	50.4	(214,930)*	19.3	2.1	0.1
Transportation	105.0	(419,400)	134.9	-	10.8
Public enterprises such as gas and electricity	50.4	(50,000)	48.2	-	35.2
Manufacturing	84.3	(339,300)	173.4	12.8	20.5
Banking and financing	37.0	(147,600)	115.6	-	25.3
Real estate	36.5	(146,000)	202.3	32.5	8.5
Imports and exports	91.5	(365,900)	240.8	12.2	47.7
Miscellaneous	35.7	(142,600)	18.9	3.1	2.1
Total	456.5	(1,825,680)	963.4	63.7	150.2

* Figures in parentheses are Japanese ¥1,000.

Note: From the aforementioned Wasaburō Kimura's Kita Shina Sekitan Keizai Ron, p. 313.

This extraction method was very inexpensive but dangerous because coal pillars were not left. The extracted sites were not filled properly but were left to be filled in by natural cave-ins. Although transportation in the main gallery was electrified, the coal faces were devoid of mechanization, as coal transport in these areas was entirely manual. The mine's development lacked planning. Large pits were not excavated, but inexpensive inclined shafts and blind pits were randomly dug. Due to the modernization of the power source, an electric power plant was established. The electric capacity of 25 cycles, however, was so small that "it was a good example of the low technological standard."[114]

The fact that Kailuang Coal Mine's output began stagnating at the beginning of the 1920s reflected the standard of its modernization. The modernization standard of Fushun Coal Mine was exceedingly high, and this was exceptional when the modernization of coal mines by foreign capital tended to stagnate. The Fushun case was exceptional because, on the one hand, the Japanese government and the capitalists had a strong craving for colonial resources, and on the other, because the main development was undertaken by Manchurian Railway Company, a semi-governmental state policy corporation. The development undertaken by Manchurian Railway avoided half-hearted modernization, which tended to be easy-going and resource-plundering. Instead, it brought about long-term and comprehensive modernization by investing a huge amount of capital.

Last, the method of controlling and mobilizing Chinese labour at Fushun Coal Mine will be touched upon. The Fushun Coal Mine's development was basically pursued under the leadership of Japanese engineers. However, it was undoubtedly achieved due to the co-operation given by the Chinese engineers and labourers. Moreover, in the interim, intermediate and junior Chinese engineers emerged and Chinese labour was trained. It is hoped that the technology acquired by the Chinese at such colonial coal mines as Fushun had some value in the modernization of Chinese coal mining after liberation. As far as the method of controlling Chinese labour at the Fushun mine was concerned, labour control was achieved relatively smoothly for the management of a modern gigantic coal mine during the stage when the labour market was not sufficiently formulated. This

can be clearly seen in the manner in which the contractor system was utilized and modernized. Based upon the experience of the bunkhouse system in Japan, the Fushun Coal Mine management used the contractor system, effectively. To clarify this point so as not to cause any misunderstanding, the main point is not aimed at glorifying a pre-modern employment pattern or the contractor system. The point is that taking Chinese labour conditions into consideration the management used the contractor system effectively and adjusted it appropriately to the modern production system. Unlike Kailuang Coal Mine, which relied upon the first Baotou system based upon contractual work, Fushun Coal Mine relied upon a more modern system comprising the second Baotou system. Exploitation and a system of pre-modern labour management often spawned great labour disputes at the Kailuang Coal Mine.[115] At Fushun Coal Mine, however, management and labour relations were relatively stable.

The twenty-first century is not far away, and any development by colonial enterprise cannot be condoned. Technology transfer and skilful labour management of a colonial nature, therefore, have no significance by themselves. These subjects were discussed here, however, with the idea that barring its colonial form, the Japanese experience of developing a colonial coal mine could offer some historical reference to those nations which are in the process of development.

NOTES

1. A United Nations University research report from the Human and Social Development Programme sub-project on "Technology Transfer, Transformation and Development — The Japanese Experience" through its Study Group on Mining Industries: Nisaburō Murakushi, "Technology and Labour in Japanese Coal Mining," 1979; also Yutaka Kasuga, "Transportation and Development of Coal Mine Technology in Hokkaidō," 1980.

2. Masao Tezuka Shina Jukōgyō Hattatsu-shi [The developmental history of Chinese heavy industries], Taiga-do, 1944, p. 14.

3. Heinrich Bauer, Shina Kōgyō Ron [A study on Chinese mining], translated by Yōkichi Takayama from Eine Studie über den Chinesischen Bergbau, Nippon Hyōron-sha, 1936, p. 44.

4. Data pertaining to endogenous coal mining in China prior to the end of the nineteenth century from Yū Haga, Shina Kōgyō-shi [The history of Chinese mining], Dentsū Shuppan-bu, 1934, pp. 83-84, and from previously cited Shina Jūkōgyō Hattatsu-shi, pp. 69-71. Also refer to other sources on the history of Chinese coal mining which will be cited later.

5. Shina Jūkōgyō Hattatsu-shi, op. cit., p. 70.

6. Sung Ying-xing, Tiangong Kaiwu [Discernment of technology], Jūichi-kumi Shuppanbu, 1943, pp. 290-292.

7. Minami Manshū Tetsudō Kabushiki Kaisha Jūnen-shi [A ten-year history of the Southern Manchurian Railway Co., Ltd.], 1919, pp. 463-464. This book will be referred to as Mantetsu Jūnen-shi. Also see Yūzō Kuboyama, Sekitan Kōgyō Hattatsu-shi [The history of the development of coal mining], Kōron-sha, 1942, pp. 401-403.

8. Masatoshi Tanaka, Chūgoku Kindai Keizai-shi Kenkyū Zyōsetsu [An introduction to the study of modern Chinese economic history], Tōdai Shuppankai, 1973, p. 215.
Atsutsune Aoyagi, Shina Kinsei Sangyō Hattatsu-shi [The history of the development of modern Chinese industries], Kurita Shoten, 1931, p. 2.

9. Yuzō Kuboyama, Shina Sekitan Jijō [The conditions of Chinese coal mining], Kōron-sha, 1944, p. 63.

10. Mantetsu Jūnen-shi, pp. 464-466.

11. Shina Sekitan Jijō, pp. 62, 94, 186, 195, 211.

12. Refer to Vol. III, Chapter two of "Dōhō Tankōgyō no Keitai" [The form of endogenous coal mining] in the aforementioned Shina Jūkōgyō Hattatsu-shi. Also see Manshū ni Okeru Kōzan Rōdōsha [Mining workers in Manchuria] by the Manchurian Railways, Mining Department, Geology Section, 1918, pp. 101-105.

13. The 3.8 million-ton theory from the aforementioned Shina Jūkōgyō Hattatsu-shi, p. 258. Assuming that the output of the endogenous coal mines would be approximately 50 per cent of the volume of the total output in Bauer's Shina Kōgyō Ron (p. 48), the writer made an estimate of 6.7 million tons. Moreover, as seen later, the estimate of one million to three million tons at the end of the nineteenth century was made on the basis of the size of the endogenous coal mine market.

14. For example, while the maximum depth of endogenous pits in Japan was 30 metres, in China it was 50 metres. The difference arose from the fact that the Chinese hoisting pulley was larger than that available in Japan. Furthermore, there is no record of the wind wheel being used in the Japanese pits.

15. The principal references pertaining to the history of Chinese coal mining are the aforementioned Shina Jūkōgyō Hattatsu-shi, Shina Sekitan Jijō, and Shina Kōgyō Ron as well as Shina Keizai Zensho [The complete work on the Chinese economy], Vol. X, Part 3, on mining, ed. by Tōa Dōbun-kai, 1908; Kazusaburō Kimura, "Hokushi Sekitan Keizai Ron" [A theory on the coal economy in Northern China], in Tōa Keizai Kenkyū [Studies on the East Asian economy], ed. by Nippon Gakujutsu Shinkō-kai, Yūhikaku, 1941, and others.

16. Regarding the history of the Kaiping Mining Bureau, a detailed analysis is presented by the aforementioned Shina Jūkōgyō Hattatsu-shi and "Hokushi Sekitan Keizai Ron." Also refer to Kairan Tankō no Hachijūnen [Eighty years of the Kailuang Coal Mine] by Bunjirō Horiuchi and Isao Mochizuki, 1960.

17. On this point refer to Hu-sheng, Chūgoku Kindai-shi [Modern Chinese history], Chapters 1 and 2, Heibon-sha, 1974.

18. Ibid.

19. For further information, refer to Vol. I, Chapter 2 of "Kokunai Shihon Tankō no Bokkō-Ki" [The emerging period of coal mines with domestic capital] and Chapter 5, Section 2 of "Kokunai Shihon Tankōgyō no Hatten" [The development of coal mining with domestic capital] in the aforementioned Shina Jūkōgyō Hattatsu-shi.

20. Kairan Tankō no Hachijūnen, p. 3.

21. Shina Sekitan Jijō, p. 202.

22. Mantetsu Jūnen-shi, pp. 464-465.

23. Shina Sekitan Jijō, p. 64.

24. Shina Kōgyō Ron, p. 151.

25. Shina Sekitan Jijō, p. 64.

26. Shina Jukōgyō Hattatsu-shi, pp. 101-104.

27. Ibid., p. 113 onward.

28. For example, Tangshan Mining Technical School was established in the Kailuang Coal Mine. Refer to the aforementioned Shina Sekitan Jijō, p. 240.

29. Regarding the entire regulations, see the aforementioned Shina Kenzai Zensho, Vol. X, pp. 398-401.

30. Pertaining to the conditions of Chinese coal mining in its second stage, refer to the aforementioned books on the history of Chinese coal mining.

31. For further information refer to the aforementioned "Technology and Labour in Japanese Coal Mining," from p. 50 onward.

32. Boris P. Torgasheff, Shina Kōgyō Rōdō Ron (Mining Labor in China, Shanghai, 1930), Chuo Kōron-sha, 1943, p. 101.

33. Ibid.

34. Concerning the conditions of Chinese coal mining in its third stage, refer not only to the aforementioned books on the history of Chinese coal mining, but also to Yōsukō Ryūiki Tankō Chōsa Hōkōku [A report on the survey of coal mines along the Yangtze River] edited by Chūshi Kensetsu Shiryō Seibi Jimusho, Shanghai, 1942; Manshū no Kōgyō [Mining in Manchuria], Dalian, Mantetsu Keizai Chōsakai, 1933; and others.

35. Concerning Japanese coal mine management in China, refer to Sekitan Kōgyō Hattatsu-shi by Yūzō Kuboyama; the aforementioned Shina Sekitan Jijō; Nippon Kōgyō Hattatsu-shi [The historical development of Japanese Mining] by Konwa-kai, Vol. 2, 1932; Shina Jūkōgyō Hattatsu-shi by Masao Tezuka; "Hokushi Sekitan-Keizai Ron" by Wasaburō Kimura, etc.

36. Regarding the management of Fushun Coal Mine, refer to the 1st, 2nd, and 3rd Mantetsu Jūnen-shi, and Mantetsu Sanjūnen Ryaku-shi by the Manchurian Railway; Manshū Kaihatsu Yonjūnen-shi [A forty-year history of Manchurian development] ed. by Manshū Kaihatsu Yonjūnen-shi Kai, Vol. 2, 1964; Bujun Tankō Tokuhon [A reader on the Fushun Coal Mine] ed. by Bujun Tankō, Dalian, 1937, etc.

37. The aforementioned Manshū Kaihatsu Yonjūnen-shi, Vol. 2, p. 35.

38. Refer to data to be cited later.

39. Regarding the development of Benxihu Coal Mine, refer to the aforementioned Nippon Kōgyō Hattatsu-shi, Vol. 2, from p. 620 onward. This mine was no bigger than a 400,000- to 500,000-ton class of coal mine.

40. Details on the development of Kailuang Coal Mine will be mentioned later. As for this section, refer to the aforementioned "Kairan Tankō," Chapter 5, in Hokushi Sekitan Kōgyō Ron by Wasaburo Kimura.

41. See the aforementioned Mantetsu Jūnen-shi, pp. 467-469.

42. Ibid., pp. 492-493.

43. Kitarō Takanoe, Nippon Tankō-shi [Records on Japanese coal mining], 3rd ed., Maruzen, 1911, p. 52.

44. Konwa-kai, Nippon Kōgyō Hattatsu-shi, Vol. 2, p. 585.

45. The Ministry of Agriculture and Commerce, Mining Bureau, Sekitan Chōsa Gaiyō [An outline of the coal-mining survey], 1913, p. 88.

46. Mantetsu Jūnen-shi, pp. 509-519.

47. Ibid., pp. 491-492.

48. See the aforementioned Nippon Kōgyō Hattatsu-shi, Vol. 2, p. 299.

49. Ibid., pp. 586-587. For further information on the fine-sand-filling method, refer to Bujun Tankō Tokuhon, pp. 102-107.

50. Mantetsu Jūnen-shi, pp. 493-494.

51. Ibid., pp. 630-633; also see Mantetsu Dainiji Jūnen-shi, 1928, pp. 764-765.

52. For further information, refer to the records pertaining to the history of coal extraction methods at various pits cited in Mantetsu Jūnen-shi and Mantetsu Dainiji Jūnen-shi. A summary in this regard is available in the aforementioned Manshū Kaihatsu Yonjūnen-shi, Vol. 2, pp. 51-55.

53. Concerning the technological standard of Mi-ike Coal Mine, refer to the aforementioned "Mitsui Zaibatsu ni Okeru Sekitangyō no Hatten Kōzō" by Yutaka Kasuga.

54. Regarding the factories at Fushun Coal Mine, refer to Mantetsu Jūnen-shi from p. 544 onward and Mantetsu Dainiji Jūnen-shi, from p. 665 onward.

55. Kimura, op. cit., p. 360. The yen conversion rate is based upon 1 pound = 17 yen. See the same book, p. 319.

56. Kairan Tankō no Hachijūnen, p. 23.

57. Bujun Tankō Tokuhon, p. 102. Regarding this method, see the same book, from p. 102 onward.

58. Nippon Kōgyō Hattatsu-shi, Vol. 2, pp. 586-587.

59. Ibid., p. 587.

60. Ibid.

61. Manshū Kaihatsu Yonjūnen-shi, Vol. 2, p. 62.

62. Ibid., p. 67

63. Bujun Tankō Tokuhon, p. 136.

64. See Mantetsu Dainiji Jūnen-shi, p. 547.

65. Nippon Kōgyō Hattatsu-shi, Vol. 2, p. 603.

66. Ibid., p. 591; Mantetsu Dainiji Jūnen-shi, from p. 587 onward, and Mantetsu Daisanji Jūnen-shi, 1938, from p. 1,865 onward.

67. For further information, see Mantetsu Dainiji Jūnen-shi, p. 665, and Mantetsu Daisanji Jūnen-shi, p. 865.

68. See ibid., from p. 780 and from p. 1,843 respectively for further information.

69. See Manshū ni Okeru Kōzan Rōdōsha [Mining labour in Manchuria], Mantetsu Kōgyōbu, pp. 11-12.

70. Ibid., pp. 235-236.

71. Ibid., pp. 237-238.

72. Ibid., pp. 242-243.

73. See the aforementioned Mantetsu Jūnen-shi, p. 496.

74. Ibid.

75. This point will be discussed in detail later.

76. See the aforementioned Manshū ni Okerū Kōzan Rōdōsha, pp. 238, 244.

77. Refer to Rōmu Sesaku Kenkyū(Jo) [A study on labour policy, vol. 1] ed. by Manshū Jūkōgyō Kaihatsu K.K. Xingjing, 1942, p. 10.
For more on the contractor system, refer to: Hajime Maeda, Tokushu Rōdōsha no Rōmu Kanri [Labour management of special labour],

Sankai-sha, 1944; Torgasheff, Shina Kōgyō Rōdō Ron; Takatoshi Nakamura, Hatō Seido no Kenkyū [A study of the Baotou system], Osakaya-go Shoten, 1944.

78. Although Torgasheff also differentiated between the two types (op. cit., pp. 73-74), this point must be treated carefully as the differentiation of the two is generally not clear cut.

79. The aforementioned Hatō Seido no Kenkyū, p. 2, also recognizes this point. It is therefore erroneous to conclude that the contractor system was simply a pre-modern system. This point will be proved in the course of this paper.

80. For further information, refer to Nisaburō Murakushi, Nippon Tankō Chin Rōdōshi Ron [A theory on the history of wage labour in Japanese coal mining], 1976, and the aforementioned Nippon Sekitangyō no Gijutsu to Rōdō.

81. Regarding Bang (guild), refer to Shiji Koyama, Shina Rōdōsha Kenkyū [A study of Chinese labour], Tōa Jisshin-sha, 1919, Vol. 1, Chapter 3, "Rōdōsha no Dantai (Bang)" [The Labour Association (Bang)].

82. Regarding the contractor system at Fushun Coal Mine, refer to Mantetsu Jūnen-shi and also Manshū ni Okeru Kōzan Rōdōsha, Minami Manshū Kōzan Rōdō Jijō by Mantetsu Romu-ka, Dalian, 1931.

83. See Mantetsu Dainiji Jūnen-shi, p. 573.

84. The entire regulations are cited in Manshū ni Okeru Kōzan Rōdōsha, from p. 245 onward.

85. Such logic is developed by the writer in Nippon Tankō Chin Rōdōshi Ron. See, i.e., p. 24.

86. Concerning the point, refer to Shina Kōgyō Rōdō Ron, p. 77; Tōa Keizai Kenkyū(1), p. 349; Mantetsu Dainiji Jūnen-shi, p. 570.

87. Consequently, Torgasheff's statement that "the contractor system, whatever form it may have, is harmful" (op. cit., p. 78) is an idealistic and one-sided criticism which ignores a certain historical role played by the system.

88. For further information, refer to Mantetsu Daisanji Jūnen-shi, from p. 18 onward.

89. See Manshū Kaihatsu Yonjūnen-shi, Supplementary Vol., pp. 85-86, and Mantetsu Dainiji Jūnen-shi, pp. 1,172-1,173.

90. See Manshu Kaihatsu Yonjūnen-shi, Supplementary Vol., pp. 87-89.

91. Ibid., p. 94.

92. Regarding this point, refer to Manshū Rōdō Nenkan [Manchurian labour almanac], by Manshū Rōdō Kyōkai, Genshō-dō, 1941, pp. 335-336.

93. For further information, refer to Mantetsu Dainiji Jūnen-shi, from p. 564 onward, and Mantetsu Daisanji Jūnen-shi, from p. 1,721 onward.

94. See Manshū ni Okeru Kōzan Rōdōsha, p. 63.

95. For further information on recruitment, refer to ibid., from p. 57 onward, and to Mantetsu Jūnen-shi.

96. See Mantetsu Daisanji Jūnen-shi, p. 1,172.

97. Regarding this point, see Mantetsu Dainiji Jūnen-shi, pp. 568-569.

98. Ibid.

99. Ibid.

100. Ibid., p. 569

101. Refer to the account on labour policy from 1927 in Mantetsu Daisanji Jūnen-shi, from p. 1,718 onward.

102. Thus it is erroneous to presume simply that labour management was totally entrusted to the contractor. For example, Hajime Maeda's statement that "a contractor manages the entire training, guidance, and other aspects of the labourers' work" (op. cit., p. 214), is completely.

103. For further information, refer to a chapter on miners entitled "Shieki Seido Oyobi Taigū" [A contract system and its terms] in Mantetsu Dainiji Jūnen-shi, from p. 570 onward.

104. Mantetsu Junen-shi, p. 497.

105. Manshū ni Okeru Kōzan Rōdōsha, p. 114. Concerning Japanese productivity, see Nippon Kōgyō Hattatsu-shi, Vol. 2, p. 211.

106. For further information, see the section on labour policy in Mantetsu Daisanji Jūnen-shi, from p. 1,718 onward.

107. Ibid.

108. On this point, refer to Manshū ni Okeru Kōzan Rōdōsha, Chapters 6 and 7, and p. 247. Also see Mantetsu Dainiji Jūnen-shi.

109. Ibid.

110 Shina Jūkōgyō Hattatsu-shi, op. cit., pp. 272-273.

111. Under the control of the foreign powers, the Chinese paid special attention to Zhongxing Coal Mine, which was developed into a large, modern coal mine by Chinese capital and engineers. Ibid., pp. 115, 148, 335. Due to limited space, the modernization of Zhongxing Coal Mine unfortunately could not be examined.

112. Wasaburō Kimura, Kita Shina Sekitan Kōgyō Ron, op. cit., p. 294.

113. For further information, refer to ibid., p. 355, Kairan Tankō no Hachijūnen. pp. 12-13 and a section in the same work entitled "Kairan Tankō no Saitan Hōhō no Ōkina Henkaku" [A major change in the extraction method at the Kailuang Coal Mine], by Wu Ging-cheng, which was quoted from Meritan Jishu, 1959, Nos. 19-20.

114. Wu's thesis, op. cit., p. 256.

115. For further information, refer to the aforementioned Wasaburō Kimura's thesis, from p. 363 onward.