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The United Nations University: 29th Floor, Toho Seimei Building, 15-1, Shibuya 2-chome, Shibuya-ku, Tokyo 150, Japan. Tel.: (03) 499-2811; Telex: J25442; Cable: UNATUNIV TOKYO

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**THE PREWAR JAPANESE STEEL INDUSTRY
AND IRON ORE RESOURCES IN SOUTHEAST
ASIA: The Development of Malaysian Iron Ore
by the Ishihara Sangyo Company**

Bunji Nagura

Professor, Faculty of Humanities
Ibaraki University, Mito
Ibaraki, Japan



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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.

INTRODUCTION

The iron and steel industry of prewar Japan tried to "modernize" itself by actively importing advanced technology, while being constantly influenced by the development of modern iron and steel manufacturing in the advanced countries of the West. In its modernization process, Japanese steel mills depended for the supply of iron ore and other raw material needs on less developed areas in Asia such as Korea, China, and the Nan'yo (South Sea) region, including British Malaya. In these areas, the Japanese steel industry, as a more advanced power, was engaged in the development of natural resources. Many attempts have been made to trace the history of the formation and development of the Japanese steel industry as a process of "modernization" through the import of advanced technology from the West. A valuable report has been already presented on the subject as a part of this project.¹ In view of this background, I would like to focus my report on the development of raw material supply sources, which constitutes another aspect of the "modernization" process of the Japanese steel industry.

More specifically, my study has limited its scope to the development of iron ore resources in British Malaya, above all that of Malay iron mines by the Nanyo Kogyo Koshi (the forerunner of Ishihara Sangyo Kaisha, Ltd.).²

I. MALAY IRON ORE, ITS IMPORTANCE TO THE JAPANESE STEEL INDUSTRY, AND ITS PHYSICAL FEATURES

To clarify the reasons for limiting the scope of my study to the development of Malay iron ore resources by Ishihara Sangyo Kaisha, I will first outline the relationship between Malay iron ore mines and the Japanese steel industry (above all the Imperial [Yawata] Steel Works) and the physical features of Malay iron ore.

The heavy dependence of steel-making in Japan on imported iron ore is extremely apparent, as is illustrated by the figures, displayed in Table 1. From the 1920s through the 1930s, imports accounted for 70 to 90 per cent of the nation's total iron ore needs (or 90 to 95 per cent, if imports from the overseas Japanese territories are also counted). The two biggest sources of Japan's iron ore imports were China and British Malaya, which were responsible for around 90 per cent, in some years almost 100 per cent, of total annual imports. China had been virtually the sole import source until 1920. Malaya emerged in 1921 as a new exporter to Japan, quickly expanded its importance as an iron ore supply source during the second half of the 1920s, and surpassed China in 1929. It retained its top position until 1940 (iron shipments from Malaya were discontinued in July 1941 as the US, UK and Netherlands froze Japanese assets in their territories).

The emergence of Malaya as the most important supplier to Japan is more evident from a breakdown of yearly iron ore deliveries to the Yawata Steel Works (the Imperial works, reorganized in 1934 into the Yawata Works of Japan Iron & Steel Co., Ltd.) in Table 2. Deliveries of Malay iron ore, which started in fiscal 1920,* surpassed those of Chinese ore

* The Japanese fiscal year begins on April 1 and ends on March 31 of the following calendar year.

TABLE 1. Yearly Volumes of Iron Ore Imports and Ratios of Dependence on China and Malaya

(Volumes in thousand tons, ratios in per cent)

Year	(A)	(B)	(C)	(D)	Dependence on China		Dependence on Malaya	
	Demand volume	Import volume	Imports from China	Imports from Malaya	C/A	C/B	D/A	D/B
1920	1,302	662	651	-	50.0	98.3	-	-
21	856	578	440	129	51.4	76.1	15.1	22.3
22	948	819	645	167	68.0	78.8	17.6	20.4
23	1,044	893	662	163	63.4	74.1	17.5	20.5
24	1,260	1,065	800	265	63.5	75.1	21.0	24.9
25	1,287	1,104	813	290	63.2	73.6	22.5	26.3
26	1,022	793	503	290	49.2	63.4	28.4	36.6
27	1,265	937	503	435	39.8	53.7	34.4	46.4
28	2,000	1,617	878	739	43.9	54.3	37.0	45.7
29	2,432	1,945	950	959	39.1	48.8	39.4	49.2
30	2,505	1,974	791	998	31.6	40.1	39.8	50.6
31	1,930	1,550	594	922	30.8	38.3	47.8	59.5
32	1,856	1,482	557	878	30.0	37.6	47.3	59.2
33	2,094	1,524	573	927	27.4	37.6	44.3	60.8
34	2,739	2,132	825	873	30.1	38.7	31.9	40.9
35	4,156	3,404	1,262	1,474	30.4	37.1	35.5	43.3
36	4,643	3,780	1,252	1,691	27.0	33.1	36.4	44.7
37	3,915	3,011	596	1,633	15.2	19.8	41.7	54.2
38	3,983	2,845	147	1,600	3.7	5.2	40.2	56.2
39	5,785	4,548	686	1,937	11.9	15.1	33.5	42.6
40	6,171	4,690	1,175	2,041	19.0	25.1	33.1	43.5
41	6,944	4,910	2,626	1,193	37.8	53.5	17.2	24.3
42	6,324	3,758	3,540	77	56.0	94.2	1.2	2.0
43	6,286	3,766	3,627	38	57.7	96.3	0.6	1.0
44	5,014	1,505	1,455	-	29.0	96.7	-	-
45	1,119	78	75	-	6.3	96.2	-	-

Source: Mines Bureau, Ministry of Commerce and Industry, Seitetsu-gyo Sanko Shiryo [Reference materials on the iron industry], and Ministry of Finance, Gaikoku Boeki Nempyo [Foreign trade year-book]. Toa Kenkyujo, Nampo Sho-chiiki no Tekko [Iron mines in various southern areas], Part 1 (1941), p. 48, was also referred to.

Note: Demand volume = Domestic output + imports - exports (minimal)

TABLE 2. Yearly Volumes of Iron Ore Deliveries to Yawata Steel Works, Broken Down by Supply Source (in thousand tons)

Fiscal year	Domestic sources	Korea	China	Malaya	Philip- pines	Austra- lia	Others (India, French Indochina, etc.)	Total
1920	1	235	515	10				760
21	0	187	481	137				805
22		91	575	169				835
23		94	607	156				856
24	3	99	682	256				1,040
25		116	646	267				1,029
26	2	132	310	293				737
27	1	234	537	485				1,257
28		215	674	754				1,643
29		224	627	863				1,714
30		222	571	889				1,681
31		111	314	618				1,042
32		152	343	766				1,261
33		209	554	1,011				1,775
34		105	515	715		8		1,342
35	1	142	914	1,183	325	315		2,871
36	2	143	763	1,440	522	170	3	3,043
37	0	52	284	1,182	363		5	1,886
38	1	50	146	1,771	740	87	180	2,376
39	2	48	267	1,153	844	1	54	2,370
40	8	38	708	955	677	2	21	2,049
41	1	251	1,172	306	230		17	1,978
42	1	217	1,528	6			14	1,766
43	13	137	1,843	11	27		6	2,037
44	106	458	728		15		2	1,308
45	314	86	29					429

Source: Yawata Iron & Steel Co., Ltd., Yawata Seitetsusho Gojunen-shi [50-year chronology of the Yawata Steel Works] (1950), a table in the appendix.

in yearly total as early as fiscal 1928. Underlying this change was the unique way in which the Imperial steel mill secured the supply of its iron ore needs.

As is well known, the development of the Imperial [Yawata] Steel Works heavily relied on its monopoly of iron ore supply from Tayeh, China, under the so-called Hanyehp'ing Kungssu Credit Arrangement. Thus from 1904 on, funds of the Deposit Division of the Ministry of Finance were continuously transferred through the Yokohama Specie Bank (initially, through the Japan Industrial Bank) to Hanyehp'ing Kungssu of China, which in return supplied the Imperial steel mill with iron ore from Tayeh (later pig iron from Hanyang, too), and repaid the loans with interest from the sale of the iron ore. This was the arrangement that helped "secure the low cost and steady supply" of Tayeh iron ore. The establishment of this buyer-seller relationship permitted of financial control over Hanyehp'ing Kungssu by Japanese imperialism, contributing to the development of the Imperial steel mill, as well as constituting a major factor in stimulating the decline of Hanyehp'ing Kungssu, China's only big coal-iron conglomerate in those days.³

However, the supply of Tayeh iron ore to the Imperial steel mill became somewhat less stable in the 1920s, not only because the development of this financial relationship in itself stimulated the decline of Hanyehp'ing Kungssu, but also because the upsurge of nationalism in China and hostilities along the Yangtze made it difficult to secure the supply of contracted quantities of iron ore. These events led the Japanese to search for a new way to ensure "steady" supply. While issuing new loans to Hanyehp'ing Kungssu, Japan eased the terms of new and old credit arrangements. To further supplement the iron ore supply from Tayeh, which was falling short of demand, Japan developed a new supply source in T'aoch'ung, halfway up the Yangtze. The Japanese Ministry of Finance transferred funds of its deposit division to Yüfan Kungssu (the Yüfan Kungssu Credit Arrangement), which was responsible for mining iron ore in T'aoch'ung, and soon afterwards the credit terms were eased. These steps to relieve the two Kungssus, however, were not effective enough to fundamentally improve the situation.⁴

When the supply of Chinese iron ore became increasingly precarious, deliveries of Malay iron ore to the steel mill began, and quickly increased. The Nanyo Kogyo Koshi, founded by Hiroichiro Ishihara in 1920, began working the Sri Medan iron mine, north of Batu Pahat in Johore State, British Malaya. Early in 1921 it started to supply iron ore to the Yawata steel works. Its deliveries significantly increased from the mid-1920s on, and thus Malaya replaced China as the biggest source of iron ore imports to Japan. Moreover, as will be described in greater detail below, in every succeeding year the Nanyo Kogyo Koshi punctually refunded the loan granted in 1924 by the Finance Ministry's deposit division, in sharp contrast to the complete defaults by Hanyehp'ing Kungssu and Yüfan Kugssu of China in the second half of the 1920s.⁵

Iron ore development projects in British Malaya by Japanese interests included those of the Sri Medan mine in Johore, and the Machang Stawn mine (or the Sun mine as it was called by its Japanese developers) in Kemaman District, Trengganu (first worked in 1924; details below), both developed by the Nanyo Kogyo Koshi, and that of the Dungun mine in Dungun District, Trengganu (first worked in 1930), by Nippon Mining Co., Ltd. They were joined in the second half of the 1930s by the Bukit Lankap mine in Endau District, Johore, developed by Iizuka Tekko K.K. (Iizuka Iron & Steel Co., Ltd.), and the Temangan mine in Kelantan, worked by Nanyo Tekko K.K. (South Sea Iron & Steel Co., Ltd., an affiliate of Nippon Kokan K.K.). Mining projects undertaken in the latter half of the 1930s in British Malaya are listed in Table 3 (see also Fig. 1).⁶

All these iron mines were exploited by Japanese interests. Although statistics on Malay iron ore output and export have not been well organized, and accordingly no absolutely reliable data are available, Table 4 may give a rough measure of the situation of iron mining in Malaya in those years. Since no modern iron-making industry existed in British Malaya, virtually the whole output of iron ore from the peninsula was exported, almost entirely to Japan.⁷ Among these iron mines, Nippon Mining Co.'s Dungun mine was very large, and led all others in output during the second half of the 1930s. It must be pointed out, however, that Nippon Mining might not have undertaken its project if it had not

TABLE 3. Operating Conditions of Iron Mines in Malaya (in 1937 - 39)

Iron mine	Mining company	Major investor	Exploitation started in	Deposit	Ore quality	Working method & equipment	Output (in 1938)	Sales outlet	Remarks
Sri Medan (Johore State)	Ishihara Sangyo Koshi	Ishihara Sangyo Kaiun Kaishun Kaisha, Ltd.	1920	3 mil. t (Iron & Steel Fe-deration)	Hematite Fe 61.8-63.0%; SiO ₂ 5.7-3.9%	Open cut stoping. Ore was discharged through three chutes, carried by track to river bank, and by barge from there to Batu Pahat port.	380,978 t	Yawata Works, Japan Iron & Steel	Loading of ocean carriers was unaffected by monsoons. Bauxite was also exploited (in 1938).
Machang Stawn (Trengganu State)	"	"	1925	0.5 mil. t (Alvin Barber)	Hematite & limonite Fe 62-67%; SiO ₂ 0.5-1.7%	Open cut. Ore was carried by rail to the mouth of Kemaman River. 1,076 workers were employed.	100,123 t	"	Tin and manganese were also exploited. Remaining iron ore deposit was small. Loading of ocean carriers was impossible in monsoon season (Dec. - Mar.).
Dungun (Trengganu State)	Nippon Mining Co., Ltd.	Nippon Sangyo, etc.	1930	51 mil. t (Min. of Overseas Affairs)	Hematite & limonite Fe 61%; SiO ₂ 2.91%	Open cut on steps provided at six-meter intervals. Ore was carried by the company's own rail to the mouth of Dungun River, and by barge from there to ocean carriers. Large pier was built at estuary. 3,448 workers were employed.	819,678 t	"	Loading of ocean carriers was impossible in monsoon season (Dec. - Mar.).
Temangan (Kelantan State)	Nanyo Tekko K.K.	Nippon Kokan K.K.	1937	6 mil. t (Alvin Barber)	Limonite Fe 50%; SiO ₂ 5-8%	Open cut stoping. Ore was carried by aerial ropeway to Bukit Besi, and from there to Tumpat port by rail. Direct rail transport was started in 1939.	162,458 t	Nippon Kokan	Direct rail transport was planned because of the limited capacity of aerial ropeway. Loading of ocean carriers was impossible in monsoon season (Dec. - Mar.).
Bukit Langkap (Johore State)	Iizuka Tekko K.K.	Shigeru Iizuka	1936	2.5 mil. t (Macdonald)	Hematite Fe 56% SiO ₂ 3.51%	Ore was carried by double-track rail truck from the mine to barge loading point, then down Endau River, and shipped overseas from Endau port at the estuary.	117,782 t	Japan Iron & Steel	Loading of ocean carriers in Endau port was impossible in monsoon season (Dec. - Mar.). Deposit of iron ore with high manganese content was found near the mine.

Source: Toa Kenkyujo, Nampo Sho-chiiki no Tekko, Part 1 (1941), appended table "Nan'yo ni okeru Tekko Saikutsu Kaisha Ichiran" [A list of iron ore mining companies operating in the South Sea Region].



FIG. 1. Distribution of Iron Mines in Malay Peninsula

Source: Toru Kumamaru, Nippon Seitetsu to Tekko Shigen (Japan Iron and Steel corporate history editing committee, 1959).

TABLE 4. Yearly Iron Ore Outputs and Exports from Malaya Broken Down by State
(in thousand tons)

Year	Johore State		Trengganu State		Kelantan State		Perak State	Total export	Johore State	Trengganu State	Kelantan State	Perak State
	Srimeidan	Langkap	Dungun	Kemaman	Temangan	State						
1921	75							75	75			
22	113							111	111			
23	157							154	154			
24	239							235	235			
25	284							280	272*	8		
26	300							296	250	46		
27	465							458	49	49		
28	620							611	585	26		
29	811							798	743	55		
30	830			90				817	729	87		
31	703			154				692	489	203		
32	699			229				688	485	203		
33	779			399				766	409	358		
34	1,154			500				1,136	578	558		
35	1,434			604				1,412	595	817		
36	1,682			600				1,655	590	1,064		0*
37	1,586			1,027				1,561	519	991		1*
38	1,642	55		1,148		50		1,616	550	160		1*
39	---	178		586		162		1,945	---	---		---
40	---	260		956		218		1,933	---	---		---
41	---	442		325		234		---	---	---		---
42	---	118		505		152		---	---	---		---
43	---			132				---	---	---		---
				68				---	---	---		---

Source: Toru Kumamaru, Nippon Seitetsu to Tekko Shigen, 1959, p. 302, as regards outputs; pp. 313 and 321 were also referred to in figuring out the outputs of Kemaman in 1928-29 and those of Sri Medan in 1939-40, respectively. Toa Kenkyujo, Toa Kogyo Tokei [Mining statistics of East Asia], 1944, p. 87, as regards exports; pp. 4 and 5, for export volumes in 1939-40 (though figures for 1934-38 on these pages differ from those on p. 87); the above cited Nippon Seitetsu to Tekko Shigen, p. 311, was also referred to for exports from Kelantan state.

Note: --- unknown; * output.

Supplementary remarks: "Total outputs" for 1928-38 in the table are almost fully consistent with the corresponding figures in Toa Kenkyujo, Nampo Sho-chiiki no Tekko, Part 1 (1941), p. 71. The outputs of each state in 1934-38 are stated in Toshiharu Otani, Marai no Keizai Shigen, 1943, pp. 147 and 150, but they are inconsistent with the figures of this table. The outputs of Dungun are consistent with figures in Nippon Mining Co., Ltd., Gojunen-shi, 1957, p. 103. Total exports in 1928-38 are stated in the above cited Nampo Sho-chiiki no Tekko, Part 1, p. 75, but they are inconsistent with the corresponding figures in this table.

been encouraged by the commercial success achieved by the Nanyo Kogyo Koshi (Ishihara Sangyo).⁸

In addition, as will be described in greater detail below, virtually the total iron ore output of the Nanyo Kogyo Koshi was supplied to the Imperial steel works. Therefore, the Japan-bound export of Malay iron ore in the 1920s consisted almost entirely of ore supplied to the Imperial steel works by the Nanyo Kogyo Koshi. That is why this study on the development of Malay iron ore is focused on the activities of the Nanyo Kogyo Koshi (Ishihara Sangyo), principally on its commerce with the Imperial steel works.⁹

The analysis below refers primarily to the period from 1930 to 1935, partly because the Malay iron mine development projects of The Nanyo Kogyo Koshi (Ishihara Sangyo) had been well under way by around 1930, and because lack of adequate reference materials prevents detailed study of those projects after the mid-1930s.

II. FOUNDING OF THE NANYO KOGYO KOSHI

The Nanyo Kogyo Koshi (South Sea Mining Company, a limited partnership) was founded by Hiroichiro Ishihara in September 1920. Notable points in the process which led to the establishment of this company include the circumstances surrounding the discovery of the Sri Medan iron mines, and details of how the company was awarded an ore supply contract by the Imperial [Yawata] Steel Works, together with the raising of funds required for founding the company and launching the mining project. With these points in mind, let us first briefly review how the Nanyo Kogyo Koshi started its business.

The three Ishihara brothers (Niroichiro, Shinzaburo and Gisaburo) had been engaged in rubber plantation development in British Malaya since 1916, with little commercial success (Shinzaburo had been in Malaya since 1911, five years before), but Hiroichiro's iron mine surveys eventually bore fruit. He discovered the Sri Medan mine in August 1919.¹⁰

Hiroichiro Ishihara lost no time in filing an application with the state government of Johore for a prospecting concession, and brought back samples of the ore he found to Japan, where he was favourably received by Kojuro Nakagawa, then President of the Bank of Taiwan. In December 1919 he paid a visit to Takeshi Shirani, director-general of the Imperial Steel Works. An engineer who was sent by Shirani to Sri Medan came back with a report that the mine yielded iron ore of "excellent quality and is highly likely to have a safely exploitable deposit of 7.5 million tons" (March 1920). In the meantime Ishihara had been granted prospecting rights (in January 1920).¹¹ Koichiro Ishihara signed an iron ore supply contract with the steel works, tentatively in his personal capacity, in April 1920.

The contract required Ishihara to supply 20,000 tons of iron ore in 1920, 50,000 tons in 1921, and 100,000 tons or more in 1922 (all fiscal years), at a price of ¥20 per ton (provided that the iron content was not less than 65 per cent) ex steel works.¹² I would like to draw the readers' attention at this point to the character of Ishihara's contract with the steel works, which was a plain sales arrangement, and as such essentially differed from those of Hanyehp'ing Kungssu and Yüfan Kungssu, of China.

The contract was in the form of a "supply order," which contained provisions unfavourable to Ishihara, unilaterally binding him to the ore purchasing needs of the steel works.¹³ However, since the contract was made "when [the Imperial Steel Works] was searching for ample supply of raw materials,"¹⁴ it assured Ishihara of steady purchasing of his iron ore. It was very significant indeed that Ishihara, an obscure young man at the time, was able to enter into such a contract with the Imperial Steel Works.

For Ishihara, who had thus concluded an iron ore supply contract with the Imperial works, the next big problem involved raising the necessary funds for his iron-mining enterprise. He was introduced by Nakagawa, President of the Bank of Taiwan, to a Formosan millionaire, Lin Hsiung-chêng, with whose personal guarantee an arrangement was made for a ¥350,000 loan from the Bank of Taiwan. The first instalment of the loan — ¥50,000 — was allocated to him in February 1920. However, the depression of the Japanese economy following the postwar panic (in March 1920) threw the Taiwanese millionaire into tight financial circumstances, forcing him to declare inability to back Ishihara any longer, blocking further financing by the Bank of Taiwan. Ishihara succeeded, however, in winning support from Kojiro Matsukata, President of Kawasaki Dockyards,¹⁵ who guaranteed Ishihara's credit up to ¥1,000,000 (by presenting to the bank 2,000 shares in Kawasaki Dockyard out of Matsukata's holdings as security) and thereby enabled him to renew his loan contract with the Bank of Taiwan, with its sum raised to ¥750,000.¹⁶

The second loan from the Bank of Taiwan having been granted, in an instalment of ¥300,000, the financial problem was no longer pressing, and the

Nanyo Kogyo Koshi was established in September 1920, capitalized at ¥100,000. On that occasion, Ishihara allocated a 50 per cent title to the mining concession to Matsukata in return for his assistance. In this connection, the initial investors in the Nanyo Kogyo Koshi nominally were: Hiroichiro Ishihara, as partner with unlimited liability, and Kojiro Matsukata and Shinkichi Tanaka (deputy for Matsukata), both as limited partners.¹⁷

The assistances extended by Kojuro Nakagawa, president of the Bank of Taiwan, Takeshi Shirani, director-general of the Imperial Steel Works, and Kojiro Matsukata, president of Kawasaki Dockyard, greatly facilitated the launching of the iron-mining venture by Hiroichiro Ishihara. The favourable attitude of the Johore state government to the iron-mining project by Japanese interests was also very significant.

The Johore government, which had granted Ishihara a mining concession, following a prospecting concession, for the Sri Medan mine in July 1920, approved his request for designation of an open port at the mouth of the Batu Pahat River in December of the same year, in spite of earlier objections by some British officials. Had the estuary not been approved as the loading port for iron ore from the Sri Medan mine, it would have required trans-shipment to ocean-going cargo ships in Singapore, 80 miles down the Strait of Malacca from the mouth of the Batu Pahat. The opening of the Batu Pahat port was indispensable for low-cost transport of iron ore from Ishihara's mine. The sympathetic posture of the Johore government was stimulated by the postwar stagnation of industrial activities in Malaya (including rubber growing and tin mining) and the resulting massive unemployment and sharp drop in tax revenues. Ishihara convinced the government that this mining enterprise and the opening of the loading port would create new jobs and increase revenue through the tax on ore exports. Inidentally, Batu Pahat was, reportedly, the first overseas port designated as an open port at the request of Japanese interests.¹⁸

The British Government, the ruler of the Malay states,¹⁹ showed no interest in the iron ore resources of the peninsula, although it did energetically promote other export industries, especially tin mining

and rubber growing, because the UK did not have to seek iron ore from so distant a source as Malaya, and had fostered iron manufacturing in India, another of her colonies where iron ore and coal resources were abundant. It is well known that the Indian iron industry, which, stimulated by the First World War, developed rapidly and exported its low-cost surplus pig iron primarily to Japan after the war, posed the biggest competitive menace to blast furnace operators in this country. In addition, the virtual unavailability of coking coal in British Malaya meant that an essential prerequisite to modern iron-making was lacking there (Malaya was even less favoured than India in terms of marketing environment as well), and even if local or British Interests had undertaken iron mining, the exploited ore would have had to be exported unprocessed and could have found no other destination than Japan. The indifference of the British Government to iron ore resources in Malaya is also demonstrated by the fact that practically no surveys had been made on iron ore deposits in the peninsula before Ishihara applied for a prospecting right in the Sri Medan mine. This situation, though it was detrimental to Ishihara's mining venture in its early stages, in the long run proved favourable to iron-mining undertakings by Japanese interests until Anglo-Japanese relations deteriorated.²⁰

III. LOANS FROM THE DEPOSIT DIVISION, MINISTRY OF FINANCE

After the founding of the Nanyo Kogyo Koshi in September 1920, development of the iron mine made rapid progress, and excavation began in December of that year. As Batu Pahat was designated as an open port at about the same time, the first shipment took place early in January 1921, two months ahead of schedule.²¹ While ore shipping commenced, the remaining ¥400,000 of the ¥750,000 loan committed by the Bank of Taiwan was allocated (in February 1921), and the iron-mining venture of the Nanyo Kogyo Koshi was launched on its historic course.²²

The yearly iron output of the mine during its early phase of operation steadily increased from 19,000 tons in 1920 to 140,000 tons in 1921, and from 200,000 tons in 1922 to 240,000 tons in 1923 (all in fiscal years.)²³ Significantly, the annual quantity of iron ore delivery stipulated by the contract of April 1920 with the Imperial Steel Works (not less than 100,000 tons from fiscal 1922 on) was already far surpassed.²⁴ However, the financial condition of the mining company was not so favourable, as it had spent enormous funds to get the project under way, while a sharp drop in iron ore prices following the First World War prevented its income from growing correspondingly.²⁵ The Sri Medan mine was then considered economically unfeasible at an annual output level of less than 300,000 tons and therefore had to step up its production. Moreover, as the freightage, which accounted for a substantial part of the cost of iron ore, wildly fluctuated, the financial status of the mining company was inevitably precarious.

In view of these circumstances, the Nanyo Kogyo Koshi planned, besides increasing the output of its Sri Medan mine, to acquire the Machang Stawn mine in Kemaman district, Trengganu,²⁶ and to undertake the marine

transport of its ore shipment itself. It filed an application with the Ministry of Finance (dated April 24, 1924; submitted through the Bank of Taiwan and Yokohama Specie Bank) for a ¥3 million loan out of the funds of its deposit division to finance the acquisition of the mine, construction of its facilities, and purchase of ships, among other things.²⁷

What deserves note regarding these events is that the Imperial Steel Works backed the mining company's business expansion plan and request for a governmental loan, and used its influence to help their realization. Immediately after the Nanyo Kogyo Koshi filed its application, Takeshi Shirani, Director-General of the works, submitted written reports "on iron ore supply to the steel works" (dated January 29) to the Minister of Finance and the Minister of Agriculture and Commerce.²⁸

In his reports, Shirani pointed out the trend of iron ore supply to fall short of the works' demand (290,000 tons short against the annual requirement of 1,040,000 tons), which he attributed primarily to the failure of Hanyehp'ing Kungssu to provide the contracted quantity of Tayeh iron ore, and to the poor deposits of the T'aoch'ung mine, which should have supplemented the supply from Tayeh. Thus the Director-General stressed the need for increased supply of Malay ore to make up for the shortage of Chinese ore and, more specifically, called for not only stepped-up production at the Sri Medan mine, but also acquisition of the Kemaman mine by the Nanyo Kogyo Koshi.²⁹

Shirani's reports were also in favour of the mining company's plan for independent marine transport of its products which he thought would enable the ore shipments to be transported at low and steady rates. He wrote: "Since both [the Sri Medan and Kemaman] mines are 2,500 nautical miles away from Wakamatsu, any sharp rise in ocean freightage would inevitably exert a considerable impact, and thereby might make it difficult for both the supplier and the purchaser to fulfil the terms of the contract. Therefore, the supplier should be allowed to take advantage of the prevailing low price level of ships, equip itself with ore carriers and thereby maintain constant supply with as little fluctuation in rates as possible."³⁰

Although the Director-General of the steel works supported the request by the Nanyo Kogyo Koshi, some difficulties had to be overcome before the loan was actually approved by the Deposit Division. In spite of the conclusion of a ¥3 million contract between the Deposit Division, Bank of Taiwan, and the Nanyo Kogyo Koshi early in June 1924,³¹ the cabinet resigned en masse immediately after that (the Kiyoura cabinet was replaced by the Takaaki Kato cabinet, a coalition of three groups advocating constitutional government, with Kazue Shoda succeeded by Osachi Hamaguchi as Minister of Finance), and the new Finance Minister enforced a tight money policy and reviewed the use of the Deposit Division funds, thereby forcing approval of the loan to be postponed indefinitely.

A proposal to institute a permanent fund to finance development of new supply sources of iron-making materials³² (the "steel-making material fund" plan) was eventually aborted under this policy to review the use of Deposit Division funds. It was much more difficult thereafter for a new loan to be approved. Fulfilment of two other loan commitments, one to Takada Shokai (for a sum of ¥5 million) and the other to Taiwan Water Power (¥10 million), was also postponed together with that to the Nanyo Kogyo Koshi, and neither of them was ever fulfilled at all. The loan to the mining company, however, was eventually rapid, though reduced by ¥500,000 to ¥2.5 million (the Deposit Division approved a loan contract for the reduced sum in October 1924).³³ The lending was executed as is broken down in Table 5. Although the exact reason why only the loan to the Nanyo Kogyo Koshi was ultimately approved is unknown, it should be noted that Takeshi Shirani, Director-General of the steel works, and Kojuro Nakagawa, President of the Bank of Taiwan, meanwhile appealed to the Minister of Finance and other government officials that the requested financial aid to the mining company was indispensable for implementation of the "national policy on iron making."³⁴

Eventually, the ¥500,000 cut-back on the loan was justified by reducing the number of ships to be bought from five to three. Details of the use of the borrowed funds are displayed in Table 6, which indicates that, after the earlier loan from the Bank of Taiwan was refunded, large sums were invested in the acquisition and construction of facilities at the

TABLE 5. Accommodation of Funds by the Deposit Division to the Nanyo Kogyo Koshi and Repayment by the Latter (until the end of June 1928)

Month & year of lending	Period of repayment	Sum lent	Sum re-paid	Balance	Remarks
		(in thousand yen)			
July 1924	Ship-buying fund repayable in five years (after two-year deferment), other funds in 15 years (after five-year deferment).	¥1,692	¥355	¥1,357	Funds were transferred as loans, from Deposit Div. to Specie Bank at annual interest rate of 0.6%, from Specie Bank to Taiwan Bank at 0.625%, from Taiwan Bank to mining company at 0.65%.
October 1924		808	253	555	
Total		2,500	588	1,912	

Source: Deposit Division, Ministry of Finance, Nanyo Kōgyō Koshi Kankei Yūzūkin ni kansuru Enkaku, 1928, p. 20.

Machang Stawn mine, and in the purchase of ships (notably, the purposes for which the loan was employed also differed from the actual purposes for which the funds lent to Hanyehp'ing Kungssu and Yüfan Kungssu were used). One cannot over-emphasize the significance of this low-interest governmental loan to finance the equipment investments (in the mine and ships) by Nanyo Kogyo Koshi in an amount, though reduced from the initially requested sum, ten times as great as the ¥250,000 capital (increased just that year from ¥100,000) of the borrower.

Incidentally, according to the contract under which the loan was granted to the Nanyo Kogyo Koshi from the Deposit Division, the mining company was supposed to deliver ore (200,000 tons of iron ore and 30,000 tons of manganese ore every year) to the Imperial Steel Works, and the works were to pay the price of the ore to the Bank of Taiwan for refundment of the loan, both its principal and the interest thereon.³⁵ In this respect alone, it was an arrangement for "preferential refundment of the principal and interest on the loan with the proceeds of ore sales," similar to the Hanyehp'ing Kungssu Credit and Yüfan Kungssu Credit arrangements. Nevertheless, as the Nanyo Kogyo Koshi obviously was a Japanese firm,

TABLE 6. Purposes for Which the Funds Lent by the Deposit Division to the Nanyo Kogyo Koshi Were Used (in thousand yen)

	Initially planned sum ¹ Scheme A	Initially planned sum ² Scheme B	Altered sum ³	Actually used sum ⁴
Purchase of Kemaman mine	300	350	350	500
Construction of Kemaman mine	300	300	300	
Equipment of Sri Medan mine				210
Purchase of ships	1,540	1,540	1,040	1,040
*Refundment of Bank of Taiwan (Toyo Takushoku) loan	650	650	650	<u>750</u>
Working fund	210	160	160	
Total	3,000	3,000	2,500	2,500

Sources: 1. A document accompanying Hiroichiro Ishihara's "Request" (dated April 24, 1924) to the President of the Bank of Taiwan (incorporated into Taisho Jusannen Nanyo Kogyo Koshi Kankei).

2 and 3. Deposit Division, Ministry of Finance, Nanyo Kogyo Koshi Kankei Yūzūkin ni kansuru Enkaku, 1928, pp. 11 and 70.

4. Ishihara Sangyo Kaisha, Ltd., Sogyo Sanjugonen o Kaiko shite, 1956, p. 43.

Note: *The outstanding ¥650,000 of the ¥750,000 loan from the Bank of Taiwan at the end of 1922 was transformed into a loan from Toyo Takushoku (see Note 16). Therefore, the underlined sum is obviously incorrect.

its contract with the Deposit Division, like any ordinary loan agreement, contained no provision for violation of the management rights of the borrower except in case of default on its part, and in this respect it decisively differed from the credit arrangements with the two Chinese Kungssus. Therefore, one may safely assume that the subsequent fate of the Nanyo Kogyo Koshi would be solely determined by the relationship between the contracted amount of ore supply and the actually delivered quantity, and that between the delivery price and the production cost. To clarify this point, let us now analyse the actual circumstances of the iron-mining business by the Nanyo Kogyo Koshi with respect to exploitation, conveyance, ship loading, and marine transport of ore (including the labour relations involved).

IV. PRODUCTION AND TRANSPORTATION OF ORE

The production of ore from the Sri Medan iron mine in its early stage steadily increased as stated above. Yearly supplies of iron ore from this and the Kemaman (Machang Stawn) mines of the Nanyo Kogyo Koshi (Ishihara Sangyo Kaiun) are listed in Table 7, which shows that ore supplies by the Nanyo Kogyo Koshi were almost wholly bound for Japan, and a predominant part of the Japan-bound shipments went to the Imperial Steel Works.

The size of annual deliveries of iron ore from Sri Medan to the Imperial Works quickly increased from the levels of the early years of the operation, and by 1924, the year in which the Deposit Division loan was granted, it well surpassed the initial contracted quantity of 200,000 tons, reaching nearly 245,000 tons. This increase was followed by further growth to 285,000 tons in 1925, 306,000 tons in 1926, and 515,000 tons in 1927. From 1928 on Sri Medan ore was joined by iron ore from Kemaman, and the combined supplies from the two sources amounted to 810,000 tons and 916,000 tons in 1928 and 1929, respectively. The yearly delivery of manganese ore from the Kemaman mine, though negligible immediately after the development of the mine, was more than 40,000 tons from 1926 on, well exceeding the initial contracted quantity of 30,000 tons.

Table 8 displays the yearly contracted quantity, delivered quantity, and unit price of "South Sea ore" supplied to the state-run iron works. Because these data are derived from some sources which were not considered in the preceding chart, there are slight discrepancies in the figures for delivered quantity between the two charts. (Both are on a fiscal year basis. The discrepancies presumably stem from the different ways in which the Nanyo Kogyo Koshi counted its shipments and the steel works

TABLE 7. Destinations of Ore Supplied by Nanyo Kogyo (Ishihara Sangyo Kaiun)
(in tons, rounded)

Description of ore	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Total
Imperial Works	19,411	136,016	179,146	190,222	244,532	285,204	305,738	514,849	785,433	854,865	3,515,416
Kenjiho			8,249					6,221			14,471
Indian Steel				23,991							23,991
Muroran Steel*				22,459	7,745						30,204
Kawasaki Dockyard					3,039					3,556	5,595
Asano Steel**					830	2,577	2,351			99	5,857
Others								71		73	144
Total	19,411	136,016	187,395	236,672	256,145	287,781	308,089	521,141	785,433	858,594	3,596,677
Kemaman iron ore									24,936	61,033	85,969
Imperial Works											
Kemaman manganic iron ore					4,322	11,515	42,918	47,358	48,416	31,622	186,150
Anshan Steel										4,638	4,638
Total					4,322	11,515	42,918	47,358	48,416	36,260	190,788
Remarks: Total of Japan-bound iron ore	19,971	138,660	199,617	238,328	273,267	305,224	357,923	581,265	872,103	966,818	3,953,176

Sources: Ishihara Gomei Kaisha, Ishihara Sangyo Kaiun Goshi Kaisha, Ishihara Sangyo Koshi Ltd., and Nangoku Mokuzai Kabushiki Kaisha, Ishihara Jigyo Gaiyo, 1930. For the "Remarks" line, Ishihara Sangyo Kaisha, Ltd., Sogyo Sanjūgonen o Kaiko shite, 1956, p. 15.

Note: The figures on the "Remarks" line presumably include manganic iron ore, but they are still too large.
*Seems to refer to Nippon Seikosho, and ** to Asano Kokura Seikosho.

TABLE 8. Contracted and Delivered Quantities of "Nanyo Ore"
(quantities in tons, unit prices on a per-ton basis)

Fiscal year	Contracted quantity	@ (ex steel works)	Delivered quantity	
1920	20,000	20.00*	18,536	{ 9,703 tons actually delivered in FY 1920, 8,833 tons carried over to FY 1921.
21	140,000	11.10	128,520	
22	160,000	10.80	169,232	{ 155,646 tons actually delivered in FY 1923, 24,354 tons carried over to FY 1924, plus 226,560 tons of fine ore.
23	180,000	10.80	180,000	
24	228,000	11.19	231,536	
25	250,000	11.05	271,200	{ 267,472 tons actually delivered in FY 1925, 3,728 tons carried over to FY 1926.
	add. 21,200			
26	296,000**	11.05	289,210	
27	485,000	11.35	485,182	
28	570,000	11.05	761,731	{ 754,965 tons actually delivered in FY 1928, 6,766 tons carried over to FY 1929.
	add. 190,000	add. 10.75		
29	700,000	11.00	862,970	
	add. 150,000	add. 10.70		
30	850,000	10.00	850,000	
31	550,000	8.70	549,237	
32	600,000	8.70	600,354	
33	650,000	10.00	Unknown	
34	700,000	11.00	Unknown	

Sources: Based on "Tekko Konyu Keiyaku Shirabe" [Inquiries into iron ore purchase contracts], "Ishihara Sangyo Kaiun Goshi Kaisha Nanyo Koseki Keiyaku oyobi Nofu Suryo Shirabe" [Inquiries into contracted and delivered quantities of Ishihara Sangyo Kaiun Goshi Kaisha's South Sea ore], "Tayeh, T'aoch'ung and Johore Koseki Tsukibetsu Nonyu Suryo Shirabe" [Inquiries into monthly delivered quantities of ore from Tayeh, T'aoch'ung and Johore], etc., all incorporated into the yearly editions of Hanyehp'ing Kungssu Kankei Shorui [Documents concerning Hanyehp'ing Kungssu], 1930-1935.

Note: The quantity of fiscal 1934 was delivered to Japan Iron & Steel Co., Ltd., while all others were to the Imperial Steel Works. The unit prices from 1920 through 1924 are taken from Deposit Division, Ministry of Finance, Nanyo Kogyo Koshi Kankei Yuzukin ni kansuru Enkaku, pp. 18-19, where, however, the unit price marked with * is stated to be ¥5.50 and all the unit prices are alleged to be contracted prices per 10 tons ex Batu Pahat estuary. Since the unit price of ¥5.50 ex Batu Pahat estuary seems to have been applied only in fiscal 1920 in reality, the ex steel works price of ¥20.00 is listed in this table for fiscal 1920, too, in conformity with the initial ore supply contract (see "Ishihara Hiroichiro yori Seitetsusho ni Teishutsu seru Johore Tekkoseki Kyokyu Ukesho" [A request for supply of Johore iron ore, submitted by Hiroichiro Ishihara to the steel works]; and accompanying documents, dated April 28, 1920). Table 14 in my "Kan'ei Yawata Seitetsusho ni yoru Tekkoseki no 'Antei-teki' Kakuho-saku" cited above was inaccurate in this respect; I would like to take this opportunity to correct my error.

** Whereas an additional quantity of 3,728 tons is mentioned in the supplement to the above cited paper of mine (Ibaraki University, Seikei Gakkai Zasshi, No. 41, 1979), this should be regarded as complementing the deliveries in fiscal 1925 (see the "Remarks" column).

APPENDIX TO TABLE 8. Monthly Quantities of "Johore" Ore
Delivered to the Steel Works (in tons)

	1929	1930	1931	1932	1933
January		71,688	67,458	36,847	26,642
February		77,380	50,138	0	19,082
March		59,051	40,773	0	0
April	65,827	107,817	75,247	152,651	85,409
May	86,665	89,436	65,431	72,455	58,834
June	76,360	83,156	55,918	54,662	35,258
July	72,838	81,802	60,706	62,770	51,861
August	71,975	76,854	42,962	50,150	66,026
September	71,062	67,312	51,674	39,238	41,047
October	65,925	73,546	42,051	51,856	*
November	82,672	49,279	56,361	35,092	*
December	61,528	62,429	62,040	35,756	*
Total		899,750	670,759	591,477	
Fiscal year total (from April to following March)	862,970	850,000	549,237	600,354	
Total from October year before to September		924,621	695,559	629,226	506,861

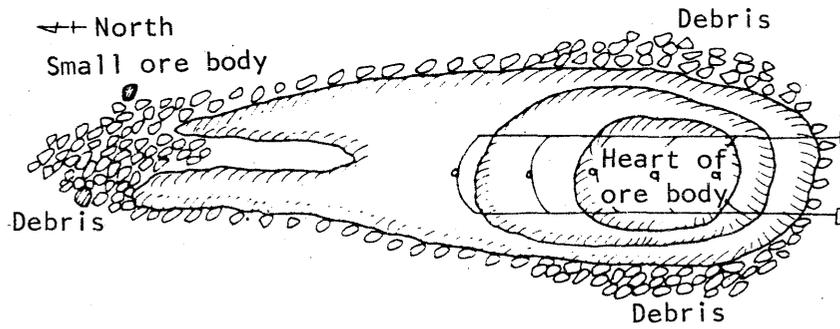
Sources: Based on "Tayeh, T'aoch'ung and Johore Koseki Tsukibetsu Nonyu Suryo Shirabe," etc., incorporated into the yearly editions of Hanyehp'ing Kungssu Kankei Shorui, 1930-1933.

Note: Information not available for months marked with *.

totalled its receipts.) The two charts, however, indicate the same general trend. Assured by the steady supply of ore by the Nanyo Kogyo Koshi, the steel works raised its quantitative requirement every year. Notably, moreover, the mining company almost never failed to deliver the required quantity, which was increased every year. Further details of the volumes of ore delivered to the steel works from April 1929 through September 1933 are given in the Appendix to Table 8. The decreases in 1931 and 1932 are attributable to cut-backs in contracted quantities following the panic in early Showa years, but not to drops in output. (This is confirmed by the fact that deliveries in February and March, the final two months of each fiscal year, were restrained and jumped in April.) The delivery price per ton, after falling off to ¥11.10 in 1921 as a result of a sharp drop in iron prices resulting from a postwar panic, remained generally constant around ¥11 until the early Showa panic. In the meantime, the production cost per ton was quickly reduced, both in "field expenses" (from ore exploitation to ocean carrier loading) and in freightage, resulting in yearly increases in "profit." The reduction of freightage costs is obviously attributable to the mining company's self-management of the ocean transport of its ore shipment. Major contributory factors to the low field expenses seem to have included, in addition to the open-cut method used in both mines, the "line flow system" of processing ore from excavation to loading on ocean carriers, together with the successful management of workers. These factors deserve more detailed analysis.

The smooth progress of the development of the Sri Medan iron mine should be attributed first of all to the comparative ease of the mining operation itself (the following description bears reference to Fig. 236). Whereas the Sri Medan mine was worked by open-cut stopping, its deposit was divided into the primary ore deposit and detrital ore deposit layers. As the detrital layer on the mid-slope alone would take years to develop, mining was started from the detrital layer.³⁷ The primary deposit was dug, first by overhand stopping and later by underhand stopping.³⁸ In the early years of Showa, the glory hole system³⁹ began to be used in combination. Regarding mining machinery, although the Nanyo Kogyo Koshi was quick to buy machine drills, the initial exploitation of the detrital

a. A plane view



b. A cross-section

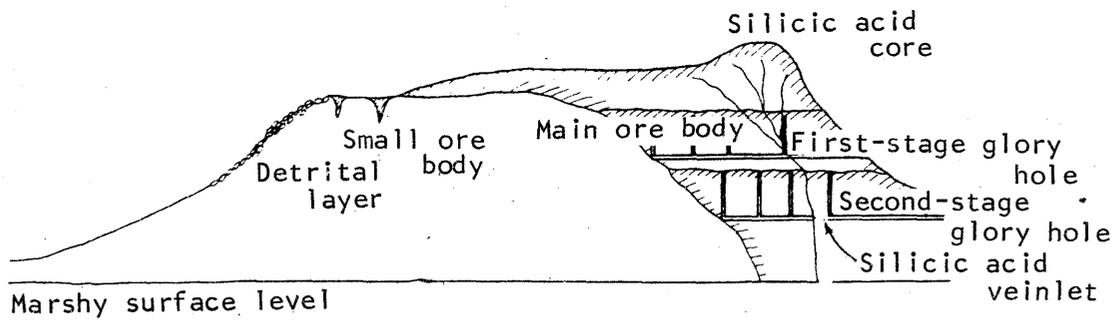


FIG. 2. Simplified Drawings of Ore Deposit in Sri Medan

Note: Prepared by Takuzo Tojyo, former senior executive of Ishihara Sangyo Kaisha, Ltd. (on 19 July 1979 at the company's head office).

layer relied primarily on manual digging;⁴⁰ in the meantime the machine drills came into use on the primary deposit.⁴¹

Ore was initially conveyed from the excavation site by a stage-by-stage pocket system, which was later replaced with a glory hole system. Extracted ore was concentrated at the foot of the hill through inclines or other means. Rail transfer for a distance of about 500 metres, from the foot of the hill to a pier on the river bank, involved pushcarts, which were replaced with a closed, continuous system.⁴² Ore was continuously carried from the end of the glory hole, on trucks or tipping wagons which were pushed down an incline, or by the continuous system, to the river bank pier, where it was loaded on barges (by dumping). Initially, loading operation at the pier was manual, but in an early Showa year, when a new canal pier was built, an improved system was installed to permit simultaneous loading of two barges at a time by mechanical tipping, resulting in even greater efficiency.⁴³

Loaded barges (locally known as tongkang) were towed by tug launches to the mouth of the Batu Pahat River. As far as Pari Slong, mid-point toward the estuary, each launch could tow only one barge, but beyond Pari Slong larger launches were used, each tugging five or six barges (up to eight eventually). As the Batu Pahat is a tidal river, loaded barges were towed down when the tide was going out, and emptied ones returned on the rising tide.⁴⁴

This uninterrupted flow of work from mining to conveyance to loading on the ocean carrier greatly contributed to reduction of the mining and transportation costs per ton.⁴⁵ This system of work almost wholly dispensed with ore stockyards; the little stockpiling that was necessary could be accommodated in the glory holes and wagons. On the other hand, it obliged workers to give up holidays (two official holidays a month as a rule) when an ocean carrier was loading. (Net working hours per day were eight to nine, because two or three hours of rest were allowed in the day.⁴⁶) Fortunately for the Sri Medan mining venture, unlike on the east coast of the Malay Peninsula, ocean carrier loading was never wholly obstructed by monsoons although it was somewhat affected by seasonal

rainfalls in December and January (see the remarks column of Table 3), and ore loading and transportation could be carried on throughout the year.⁴⁷

In considering the notable features of the iron mining operations of the Nanyo Kogyo Koshi (Ishihara Sangyo), the company's very tactful management, through contractors, of its workers (who were organized according to race and job classification), merits close examination. Sixty to 70 per cent of the work force consisted of Chinese, and the remaining 30 to 40 per cent consisted of Malays, Javanese, and Indians. The Chinese "coolies" were engaged in ore digging, and ocean carrier loading, the types of work which required the strongest muscular power, while Javanese were assigned to the continuous system operation, barge crews consisted of Indians (who previously had been fishermen in Southern India and therefore were well accustomed to life on the water), and launches were manoeuvred by Malays or Javanese.⁴⁸ The ethnic mix of the employees of the Ishihara enterprises⁴⁹ in 1930 is shown in Table 9. The success in this method of personnel management, according to race and job classification, is said to have attracted note even in those days.⁵⁰

Non-Japanese workers were employed not directly by the Nanyo Kogyo Koshi (Ishihara Sangyo Kalun), but indirectly through contractors known as kepala, and on operation site a coolie foreman (called mandur) was responsible for supervision of workers. The company paid wages through kepala and exercised labour management through mandur.⁵¹ Although their work was hard, the labourers had high morale as their per-head wages were substantially more attractive than those paid to workers in rubber plantations or a tin mine in the vicinity.⁵² This high morale, coupled with the organization of the work force according to race and job classification, greatly contributed to successful industrial relations, and virtually no significant labour disputes are said to have arisen.⁵³

As a result of the "line-flow" operation system mentioned above, the mining, conveyance, and other costs per ton seem to have been kept remarkably low, in spite of the relatively high per-head wage level.⁵⁴

Business administration of the Nanyo Kogyo Koshi was a combination of tactful labour management, taking advantage of the colonial character-

TABLE 9. Breakdown of Employees of the Ishihara Business by Job and Ethnic Background (as of 31 May 1930)

Place of employment	Job	Chinese	Malays	Javanese	Indians	Total non-Japanese	Japanese
Sri Medan mine	Miners	597	-	-	-	597	Batu Pahat office 16
	Porters	133	-	38	6	277	Sri Medan mine 29
	Transport workers	176	85	-	387	648	Pari Slong relay station 4
	Odd-jobbers	41	1	7	15	64	Sub-total 49
Machang Stawn mine	Miners	430	36	-	-	466	Kemaman office 27
	Porters	-	89	-	-	89	Chukai (Kemaman) 8
	Transport workers	185	40	-	100	325	Sungei Pinang relay station 4
	Odd-jobbers	-	-	-	-	-	Sub-total 39
Singapore	Odd-jobbers	1	-	-	2	3	Singapore 12
Temma mine	Miners	40	-	-	-	40	Temma mine 3
	Odd-jobbers	3	-	-	-	3	
Kemaman sawmill	Woodcutters	50	25	-	-	75	
	Sawyers	20	10	-	-	30	Komaman sawmill (including log yard) 6
	Odd-jobbers	-	2	-	-	2	
Sub-total		1,676	288	145	510	2,619	Total of overseas employees 109
							Domestic employees (in Kobe, etc.) 44
							Seafarers 296
							Total 449

Source: Based on Ishihara Jigyo Gaiyo [An outline of the Ishihara business], 1930

Note: The Ishihara Businesses refer to Ishihara Gomei Kaisha (Ishihara & Co., an unlimited partnership), Ishihara Sangyo Kaiun Goshi Kaisha, Ishihara Sangyo Koshi Ltd. (Singapore) and Nangoku Mokuzaï Kabushiki Kaisha (South Sea Lumber Co., Ltd.).

istics of the labour market in British Malaya, and rationalization of the mining and conveyance processes.

The independent marine transport by the Nanyo Kogyo Koshi of its product significantly contributed to reducing the per-ton transport cost of the ore. Its expansion and the circumstances which led the company to diversify itself into commercial shipping activities are of interest. As is described above, the loan from the Deposit Division was curtailed by ¥500,000, which corresponded to the difference between ¥1,540,000, required for buying five ships, and ¥1,040,000, the price of three. In consequence, the Nanyo Kogyo Koshi first purchased three 7,000-ton class vessels (the Kinsen Maru, Ginsen Maru, and Marai Maru) in 1924.⁵⁵ However, as it was obvious from the outset that this fleet of three ships would be too small to carry the whole output of ore, which was expanding, they were supplemented with rinjisen (ships owned by others in which surplus space is utilized for the transport of cargo, as opposed to shasen, the shipper's or the operator's own ships) to satisfy the ore transport needs adequately. Although "ore transport by its own fleet" is talked about, in reality the Nanyo Kogyo Koshi, from 1924 to 1926, commissioned transport through the joint operating division it established with Machida Shokai [Machida Trading Co.]. (The mining company's fleet was combined with Machida Shokai's two 7,000-ton class vessels under the joint division's control.) The former chose the latter, an expert in fleet operation, as its partner "with a view to securing safe transport at a constant freight rate."⁵⁶ Later, the Nanyo Kogyo Koshi discontinued joint operations with Machida Shokai, and undertook literal "self-operation of marine transport," which also involved time-chartered ships (teiki yosen) and rinjisen in addition to its shasen. The operation of this combined fleet of shasen, teiki yosen and rinjisen, well adapted to the ups and downs of the shipping market, was managed with great success, and is said to have made important contributions to steady and inexpensive transport.⁵⁷

The cargo volume hauled by the fleet of the Nanyo Kogyo Koshi is broken down in Table 10 by status of ship and cargo item. Shasen were responsible for the transport of only 20 to 40 per cent of the cargo volume.

TABLE 10. A Breakdown of Cargo Volumes Hauled by the Nanyo Kogyo Koshi
(volumes in metric tons; ratios are percentages)

Fiscal year	Cargo item	Volume of each item	Ratio of same	Total volume hauled	Volume hauled by each category of ships		Ratio of same
1920	Iron ore	19,411	100.0	19,411	Rinjisen	19,411	100.0
1921	Iron ore	136,016	100.0	136,016	Rinjisen	136,016	100.0
1922	Iron ore	187,395	100.0	187,395	Rinjisen	187,395	100.0
1923	Iron ore	236,672	100.0	236,672	Rinjisen	236,672	100.0
1924	Iron ore	256,145	98.3	260,467	Shasen	50,935	20.0
	Manganese	4,322	1.7		Teiki rinjisen*		
1925	Iron ore	287,781	78.2	367,967	Shasen	156,654	42.6
	Manganese	11,515	3.1		Teiki rinjisen*	211,312	57.4
	Coal	60,628	16.5				
	Sundries	8,043	2.2				
1926	Iron ore	312,070	69.8	467,334	Shasen	140,312	31.3
	Manganese	42,918	9.6		Teiki yosen	89,472	20.0
	Coal	92,232	20.6		Rinjisen	217,551	48.7
	Sundries						
1927	Iron ore	521,141	77.0	676,408	Shasen	146,186	21.6
	Manganese	47,358	7.0		Teiki yosen	267,613	39.6
	Coal	88,527	13.1		Rinjisen	262,609	38.8
	Sundries	19,382	2.9				
1928	Iron ore	810,369	76.1	1,052,419	Shasen	155,675	14.8
	Manganese	48,416	4.6		Teiki yosen	619,130	58.8
	Coal	178,079	16.9		Rinjisen	277,614	26.4
	Sundries	15,555	2.4				
1929	Iron ore	919,627	80.4	1,143,500	Shasen	345,754	30.2
	Manganese	36,240	3.2		Teiki yosen	418,454	36.6
	Coal	170,122	15.0		Rinjisen	379,291	33.2
	Sundries	17,512	1.4				

Source: Ishihara Jigyo Gaiyo, 1920, p. 11.

Note: * Literally translated, regular temporary ships. This term seems to refer to, among ships jointly operated with Machida Shokai, those other than shasen.

As a matter of course, the mining company's iron ore and manganese ore shipments constituted an overwhelming proportion (around 80 per cent) of the total volume. However, as these shipments were destined for Japan, their exclusive transport would have left the cargo space unoccupied on the outbound runs of the fleet. Therefore, coal and sundry shipments were picked up to fill the outbound cargo space. Coal was carried from Miike in Kyushu, Japan, to Singapore, and from Dairen to Manila.⁵⁸

This "self-operation of marine transport" by the Nanyo Kogyo Koshi made tremendous contributions to the reduction of the ore transport cost, as is diagrammed in Figure 3, where the transport costs per ton of ore in successive years are shown in indices, with that in 1924 represented by 100. The cost thus began to quickly decrease in or around 1923, reaching somewhere between 73 and 74 in 1931 and 1932. Whereas the fleet had only three shasen until 1923, the company bought four more 7,000- to 8,000-ton class vessels in 1929, and respectively three, one, and two more 8,700 tonners in 1930, 1931, and 1932, and had two more vessels built in 1932 (the 8,657-deadweight-ton Nagoya Maru and the 8,772-deadweight-ton Johore Maru ordered from the Nagasaki Shipyard of Mitsubishi Heavy Industries and Harima Shipbuilding & Engineering Co., respectively). Thus by the end of 1932 Ishihara Sangyo Kaiun quickly emerged as a major entity in the shipping market, with its owned fleet of 15 vessels totaling some 120,000 tons.⁵⁹

It was not until March 1931, when Ishihara Sangyo Kaiun Goshi Kaisha (the Nanyo Kogyo Koshi had been so renamed in 1929) developed its Java-bound service (South Sea service), that the company began seriously to establish its presence in the shipping market. Sufficient space is not available here to describe in detail the situation of the shipping industry in those days, but a brief explanation of the circumstances which led to the opening of the Java service is called for.

As mentioned above, Ishihara Sangyo Kaiun had significantly expanded its owned fleet by 1929. Hiroichiro Ishihara, with an eye to promoting trade with the South Sea region by utilizing his company's fleet and the Southern Godown Company, Limited,⁶⁰ decided to open a Java-bound shipping

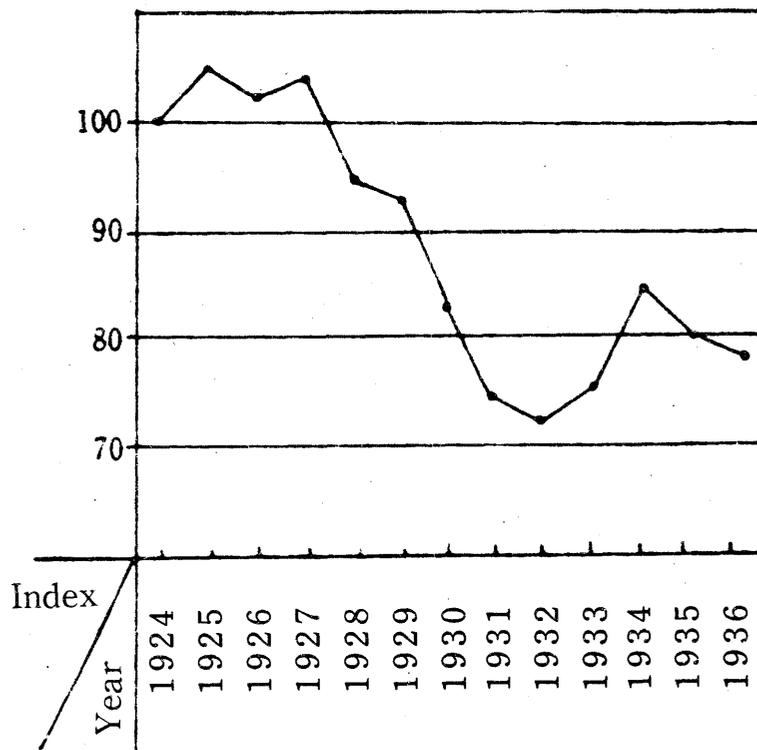


FIG. 3. Yearly Changes in Ore Transport Cost per Ton (1924 = 100)

Source: Ishihara Sangyo Kaiun Kaisha, Ltd., Sogyo Nijunen-shi, 1941, an appended table.

TABLE 11. Cargo-Loading Shares in the Japan/Java Liner Service

	1930	1931	1932	1933	1934
Ishihara Sangyo Kaiun	-	15%	29%	35%	35%
Java China Japan Line	55%	50%	36%	31%	38%
Nanyo Yusen	27%	19%	18%	20%	16%
Osaka Shosen	18%	16%	17%	14%	11%

Source: Ishihara Sangyo Kaiun Kaisha, Ltd., Sogyo Nijunen-shi, 1941, p. 87.

service. In those days, imports from Japan accounted for only around 10 per cent of the overall import volume of the Dutch East Indies; accordingly Japanese products were likely to find a receptive market. Since the owned fleet of Ishihara Sangyo Kaiun had practically no cargo to carry on its outbound runs, it was expected that transporting Japanese goods southward by this fleet "at cost" would contribute to promoting the nation's export trade. However, the South Sea route, which was a liner route specifically designated by a cabinet order, was at that time served by Osaka Shosen Kaisha (OSK Line) and Java China Japan Line (JC), a joint body of Nanyo Yusen (South Sea Mailboat Co.) and Dutch Steamship Co. (Nippon Yusen Kaisha or NYK Line also had navigation rights though they were not active on this route.) These four shipping lines organized a freight conference, which set the freightage for sundries at ¥12, the first-class passenger fare at ¥250 and so on. Ishihara launched a low-cost service, with the outbound trips of its ore-carrying fleet (hauling from 700,000 to 800,000 tons of ore a year) at a sundries rate of ¥8 and first-class passenger fare of ¥150, with a frequency of three sailings a month. Ishihara's participation in the market triggered so fierce a cargo booking race that a half-year later the conference had to reduce its tariff rates by 50 per cent, but Ishihara, never discouraged by its losses incurred by the drop in freightage, kept on winning the race. (See Table II listing the cargo loading shares of the participating shipping lines.) The mining-shipping company is said to have suffered a total loss of ¥2 million from its marine transport operations in those three years. As will be seen elsewhere in this paper, Ishihara Sangyo Kaiun in the second half of 1932 registered a heavy deficit, which presumably is in part attributable to the shipping operation's deficit. JC experienced a particularly steep drop in freightage, and the government of the Dutch East Indies eventually took steps to curb importation of Japanese products. The conflicts between the Japanese and Dutch governments, and between shipping interests of the two countries, led to the convocation of the Japan-Dutch trade conference (January 1934, in Batavia) and Japan-Dutch shipping conference (January 1935, in Kobe).⁶¹

V. BUSINESS RESULTS

In view of the above-described situation of mining and shipping operations by the Nanyo Kogyo Koshi (Ishihara Sangyo Kaiun), the per-ton production cost of the ore it supplied is presumed to have steadily decreased, but this cannot be readily demonstrated by available reference materials. Table 12 has been prepared to show year-to-year changes in the per-ton production cost of iron ore from Sri Medan, broken down into individual cost factors. Since it is based on many different sources of information, some of which concern only planned spendings (budgets), care must be taken in detailed comparison, but the chart will reveal general trends.

The stability of the contracted unit price of iron ore ex steel works is very important. The delivery price of ore, which had dropped immediately after the postwar panic, thereafter remained steady at about ¥11 until the Showa panic. Therefore, the profitability of Sri Medan iron ore in those days depended on how much its per-ton production cost could be reduced. Here again is found the benefit of the steady buyer of ore, the Imperial Steel Works, to the Nanyo Kogyo Koshi (Ishihara Sangyo Kaiun).

Now, roughly speaking, the production cost of iron ore until the end of the Taisho period (1926) was around ¥11, about equal to the contracted unit price ex steel works and accordingly providing no substantial "profit" to the supplier. To be more exact, however, the production cost was slightly below the contracted unit price in 1924 and about equal to the prescribed price in 1925 and 1926, though pertinent data somewhat differ from one source to another.⁶²

About a half of the ore production cost of around ¥11 until the end of the Taisho period consisted of freightage. Therefore it was important

TABLE 12. A Cost Analysis of Sri Medan Iron Ore (in yen/ton; figures in parentheses are in Straits dollars/ton)

	2nd half 1922 ¹	1923 budget ²	1924 ³	1925 budget ⁴	1925-26 rough estimate ⁵	Expenses of Batu office per ton		
						1925	1926	
Mining cost	1.41	(1.24) 1.40	(1.152)	(1.240)		1.442	1.545	
Transport cost	1.66	(1.35) 1.55	(1.248)	(3.278)	(1,390)	(3.480)	1.666	1.733
Export duty	0.82	(0.70) 0.80	(0.537)	4.632	(0.540)	4.524	1.022	0.675
Business expenses			(0.341)	(0.310)			0.216	0.190
Interest	1.49	(1.14) 1.30	0.440	0.380			[+0.582]	[+0.555]
Insurance premium			0.516	0.470			0.347	0.300
Depreciation			0.019	0.020			0.020	0.020
Miscellaneous losses	0.88	(0.22) 0.25		0.400			0.120	0.300
Sub-total	5.66	(4.65) 5.30	5.607	5.794	5.60		[+0.582] 4.883	[+0.555] 4.763
Ocean freight	4.83	5.55	5.421	5.420	5.50		5.420	5.530
Total	10.49	10.85	11.028	11.214	11.10		[+0.582] 10.253	[+0.535] 10.293
Contracted unit price ¹¹	10.80	10.80	11.19	11.05	11.05		11.05	11.05

- Sources: 1, 2. "Taisho Juninen Rokugatsu yori Taisho Jusannen Sangatsu ni itaru Yosan" [The budget from June 1923 till March 1924] addressed from counsellor Nagasaki to part-time staff member Saito, July 29, 1924 (incorporated into Taisho Jusannen Nanyo Kogyo Koshi Kankei).
- 3, 4. "Taisho Juyonendo Tekko Genka Keisan-hyo" [The iron ore cost-accounting table for fiscal 1925] (incorporated into Taisho Jugonen yori Showa Yonen ni itaru Nanyo Kogyo Koshi Kankei Shorui [Documents concerning the Nanyo Kogyo Koshi from 1926 till 1929]).
5. Hiroichiro Ishihara, "Seitetsu Genryo Tekko Kyokyu no Shorai wa Yuryo no Yo Nashi" (Tetsu to Hagane, Vol. XII, No. 9, September 1926).
6. "Jigyō Yotei narabini Shushi Yosansho" [The programme of business activities and budget of revenue and expenditure] or "Jigyō Yotei narabini Keijohi Yosansho" [The programme of business activities and budget of ordinary expenses] for every year from fiscal 1925 till 1928 (incorporated into Taisho Juyonen Nanyo Kogyo Koshi Kankei [Concerning the Nanyo Kogyo Koshi, 1925] and Taisho Jugonen yori Showa Yonen ni itaru Nanyo Kogyo Koshi Kankei Shorui).
7. The Nanyo Kogyo Koshi, Kozan-bu Gyomu Son'eki Keisansho [The operating profit-and-loss statement of the mining division], Sempaku-bu Gyomu Son'eki Keisansho [The operating profit-and-loss statement of the shipping division] and Eigyobu Gyomu Son'eki Keisansho [The operating profit-and-loss statement of the business division] (all for the first half of fiscal 1928).
8. Ishihara Sangyo Kaiun Goshi Kaisha, Kozan-bu Gyoku Son'eki Keisansho and Sempaku-bu Gyomu Son'eki Keisansho, both for the second half of fiscal 1929.

Pahat mining of ore (budget) ⁶				Reference 1 2nd half 1935 ⁹		Reference 2 Malay iron ore around 1935 ¹⁰	
1927	1928	1st half 1928 ⁷	2nd half 1929 ⁸	Sri Medan	Average of Sri Medan Kemaman	Min.	Max.
1,492	1,665	(0.905)	(0.638)	(0.928)	(0.926)	(0.50)	(0.80)
1,692	1,968	(0.842)	(0.796)	(0.437)	(0.558)	(0.60)	(1.50)
0.632	0.726	(0.433)	(0.418)	(0.483)	(0.481)	(0.40)	(0.40)
0.197	0.171	(0.197)	(0.261)				
[+1.159]	[+0.910]	[+0.375]	[+ ?]	(0.218)	(0.302)		
		(0.003)	(0.002)	(0.031) Profit	(0.029) Profit	(0.60)	(0.70)
		(0.070)	(0.070)				
0.400	0.440						
		(0.023) Profit	(0.025)	(0.021) Profit	(0.018) Profit		
[+1.159]	[0.910]	*1	*2	*3	*3		
4.413	4.970	(2.427)→2.937	(2.210)→2.519	(2.023)→4.046	(2.210)→4.420	(2.10)→4.20	(3.40)→6.80
		4.710	4.340			5.50	6.00
		[+0.375]	[+ ?]				
		7.647	6.859			9.70	12.80
11.35	11.05	11.05	11.00				

9. Ishihara Sangyo Koshi (Singapore), tables of overall production costs for the 11th and 12th terms (the first and second halves, respectively, of 1935) in Singapore Sokatsu Hokokusho [A general report from Singapore].

10. South Sea Division, Ministry of Overseas Affairs, ed., Nampo ni okeru Tekko Shigen [Iron ore resources in the southern region], Nampo Keizai Chosakai, 1937, p. 77. Toa Kenkyujo, Nampo Sho-chiiki no Tekko, Part 1 (1941), pp. 88-89, was also referred to.

11. Table 8 above.

Notes: Based on currency parities of 1 Straits dollar = ¥1.21 (*1), 1 Straits dollar = ¥1.14 (*2) and 1 Straits dollar = ¥2.00 (*3). Banking Bureau, Ministry of Finance, Ginko-kyoku Nempo [The annual reports of the Banking Bureau], were referred to for all. Other conversion rates are directly taken from the original sources of information. Every bracketed figure under heading 6 was calculated by dividing the total of the business expenses of the Singapore branch and head office by the tonnage of Sri Medan iron ore shipped out. Every bracketed figure under heading 7 was calculated by dividing the ordinary expenses (business expenses, interest, insurance premium and miscellaneous losses) of the business department by the tonnage of Sri Medan iron ore shipped out. The business expenses, interest and miscellaneous losses under heading 9 include those of the Singapore office. "Kemaman" includes manganese ore. The figure for every item was calculated by division by the tonnage of ore dug. The "transport costs" for Kemaman and under heading 10 include manual conveyance cost and land conveyance cost, respectively.

to reduce the freightage cost, but the per-ton freightage rate hardly decreased until the end of the Taisho period and, as Table 12 shows, appreciably dropped in 1928 and 1929. These data are consistent with Figure 3 (where further drops in 1930 and 1931 are indicated).

In 1928 and 1929, as a result of a sharp fall not only in freightage but also in "subtotal" (including, on a per-ton basis, all such expenses, besides the so-called "field expenses" incurred from the time of mining until that of ocean carrier loading, such as business expenses, interest, and insurance premiums), the total production cost was substantially decreased. Presumably difference from the contracted unit price greatly expanded, and significant "profits" accrued (though it has to be noted that, because no data are available on the "ordinary expenses of the business department" in the second half of 1929, these expenses are missing in the table). While the mining and transport costs, and export duty in 1928-1930 were all markedly smaller than in 1923-1925, a sharp drop in mining costs from 1928 to 1929 deserves particular note. It presumably was connected to a steep increase in ore output from 1927 to 1929.⁶⁴ Obviously, this drop in cost reflected not only the increase in output but also the rationalization of the mining and conveyance processes and the "line-flow" operating system integrating functions from mining to ocean carrier loading. The per-ton mining cost was reduced so much that it accounted for only 10.6 per cent of the total production cost in the second half of 1929, when it stood at 0.638 Straits dollars (¥0.727). (The transport cost, too, constituted only 13 per cent of the total cost.)⁶⁵ Thus iron ore mining in Sri Medan not only broke even, but even began to yield large profits by 1928 or 1929.⁶⁶

For supplementary reference, figures in or around 1935 are also listed in the chart. Notably, they indicate that, although the mining cost of Sri Medan iron ore increased, its transport cost substantially decreased, with the result that its "subtotal" was even smaller than the minimum estimated production cost of Malay iron ore in the same period.

The overall business performance of the Nanyo Kogyo Koshi (Ishihara Sangyo Kaiun) (see Tables 13 and 14) will be analysed next. Immediately

TABLE 13. Semi-annual Business Results of the Nanyo Kogyo Koshi
(Ishihara Sangyo Kaiun) (sums in thousand yen, rate in %)

Fiscal year	Revenue	Expen- diture	Profit (loss)	Capital	Profit rate
At the time of in- auguration in 1920	-	8	(8)	100	-
1921 1st half	893	894	(1)	100	-
1921 2nd "	823	821	2	100	4.0
1922 1st "	1,025	1,021	4	100	8.0
1922 2nd "	911	912	(1)	100	-
1923 1st "	1,055	1,057	(2)	100	-
1923 2nd "	1,213	1,221	(8)	100	-
1924 1st "	1,350	1,365	(15)	250	-
1924 2nd "	989	972	17	250	13.6
1925 1st "	1,783	1,744	39	250	31.2
1925 2nd "	1,705	1,690	15	250	12.0
1926 1st "	2,181	2,154	27	250	21.6
1926 2nd "	2,257	2,224	33	250	26.4
1927 1st "	3,352	3,334	18	250	14.4
1927 2nd "	3,626	3,534	92	250	73.6
1928 1st "	4,796	4,689	107	250	85.6
1928 2nd "	4,888	4,757	131	250	104.8
1929 1st "	5,609	5,423	186	1,500	24.8
1929 2nd "	5,153	4,953	200	1,500	26.7
1930 1st "	5,203	4,892	311	1,500	41.5
1930 2nd "	4,178	3,923	255	1,500	34.0
1931 1st "	4,001	3,786	215	1,500	28.7
1931 2nd "	3,453	3,422	31	1,500	4.1
1932 1st "	3,677	3,648	29	1,500	3.9
1932 2nd "	3,173	3,354	(681)	1,500	-
1933 1st "	4,981	4,570	411	1,500	54.8
1933 2nd "	5,481	5,248	233	1,500	31.1

Source: Ishihara Sangyo Kaiun Kaisha, Ltd., Sogyo Nijunen-shi, 1941, an appended table.

Note: Ishihara Sangyo Kaiun Goshi Kaisha in and after fiscal 1929.

TABLE 14. Semi-annual Sums of Capital and Working Funds of the Nanyo Kogyo Koshi (in thousand yen)

Fiscal year	Capital	Debt	Cumulative sum of reverse	Carry-over	Total
At the time of inauguration in 1920	100	-	-	-8	92
1921 1st half	100	750	-	-1	849
1921 2nd "	100	688	-	-2	786
1922 1st "	100	682	-	1	783
1922 2nd "	100	600	-	-	700
1923 1st "	100	650	-	-2	748
1923 2nd "	100	600	-	-11	689
1924 1st "	250	2,500	-	-26	2,724
1924 2nd "	250	2,500	-	-9	2,741
1925 1st "	250	2,700	-	-	2,950
1925 2nd "	250	2,650	-	-	2,900
1926 1st "	250	2,683	-	-	2,933
1926 2nd "	250	2,415	-	-	2,665
1927 1st "	250	2,253	-	-	2,503
1927 2nd "	250	2,084	-	15	2,349
1928 1st "	250	2,560	-	35	2,845
1928 2nd "	250	2,426	-	70	2,746
1929 1st "	1,500	2,036	-	90	3,620
1929 2nd "	1,500	1,850	-	203	3,553
1930 1st "	1,500	1,370	-	330	3,200
1930 2nd "	1,500	1,314	-	34	2,848
1931 1st "	1,500	1,256	463	55	3,274
1931 2nd "	1,500	1,198	545	32	3,275
1932 1st "	1,500	1,137	560	6	3,203
1932 2nd "	1,500	1,075	563	-174	2,964
1933 1st "	1,500	1,011	529	42	3,082
1933 2nd "	1,500	1,300	500	275	3,575

Source: Ishihara Sangyo Kaiun Kaisha, Ltd., Sogyo Nijunen-shi, 1941, an appended table.

Note: Ishihara Sangyo Kaiun Goshi Kaisha in and after fiscal 1929.

after its establishment the company by no means fared well, and registered deficits in all semi-annual terms except two, until the first half of 1924. Capitalized at only ¥100,000, it also was in a precarious funding position, heavily in debits. In those years, the aforementioned ¥750,000 loan from the Bank of Taiwan barely kept the company financially solvent."

However, circumstances began to change about the time the Deposit Division of the Ministry of Finance issued a loan of ¥2,500,000 in 1924. Thus the Nanyo Kogyo Koshi registered a profit every term from the second half of 1920 on. In the three successive terms beginning with the latter half of 1927, it achieved remarkably high profit rates of 74, 86 and 105 per cent, apparently reflecting the smooth development of the mining, land conveyance and self-operated marine transport of iron ore. However, as the company's capital was only ¥250,000 in that period, the absolute amounts of profit were not so large; a little over ¥130,000 even in the second half of 1928, when the profit rate was as high as 105 per cent. To illustrate the situation, the total capital-profit ratio, or the proportion of profit to total liabilities and net worth, was only 9.5 per cent, even in the latter half of 1928, suggesting the vital importance of the governmental loan to the company's operations.

All the debts of the Nanyo Kogyo Koshi in that period were not owed to the government, though. The loan accommodated by the Bank of Taiwan at the outset of the venture was refunded with part of the loan from the Deposit Division, as stated above, but the mining company borrowed ¥200,000 in the following year (1925) from the bank's own treasury to meet a temporary shortage of funds needed to finance the completion of the mining facilities in Kemaman (Machang Stawn). The Imperial Steel Works, looking forward to an additional supply of manganese ore from the mine, supported the Nanyo Kogyo Koshi's request for this ¥200,000 loan from the Bank of Taiwan.⁶⁸

The ¥200,000 loan from the bank made the total debt of the Nanyo Kogyo Koshi ¥2,700,000, but its outstanding balance kept on decreasing thereafter. In other words, the company steadily repaid its borrowing from

the Deposit Division over the subsequent years.

Annual Jigyo Yotei narabini Shushi Yosansho⁶⁹ [The programmes of business activities and budgets of revenue and expenditure] from 1925 through 1928 reveal how steadily the business developed. The Nanyo Kogyo Koshi, as indicated in Table 15, so formulated its "budget of revenue and expenditure" as to yield a surplus without fail every year, by incorporating into the annual budget a plan concerning the debt repayment and "resources" therefor. In fact, as far as the governmental (Deposit Division) loan is concerned, documentary evidence is available to confirm punctual refundments of prescribed installments.⁷⁰

Since Tables 13 and 14 give only overall figures, more detailed accounting data are called for, but no such consistent data are available. Table 16 shows a balance sheet for three years, from the first half of 1925 through the second half of 1927. It is inconsistent with Tables 13 and 14 in some respects. For instance, there are big differences in profits in the second half of 1926 and the first half of 1927, and in Table 16 debt balances are not only generally greater but even represent a temporary increase in the latter half of 1926. According to this chart, reserves began to be set aside in the second half of 1926.

Table 17, which refers to only two semi-annual terms, the first half of 1928 and the second half of 1929, lists only the revenues and expenditures in the operating profit and loss statements of the mining, shipping and business divisions. (Data on the business division in the second half of 1929 are lacking.) According to this chart, in the first half of 1928 the mining division suffered a deficit of 30,000 Straits dollars (equivalent to about ¥37,000), of which losses from manganese mining in Kemaman accounted for a particularly large part. It should be kept in mind, however, that the revenue of the mining division (the total of ordinary account budget) as listed in this chart is the product of multiplication of the "budgeted unit price" by the "actually shipped-out quantity," and, on the other hand, the expenditure (the total of ordinary account settled) is that of the actual unit price multiplied by the "actually shipped-out quantity." Similarly, the revenue of the shipping division is

TABLE 15. The Yearly Budgets of Revenue and Expenditure of and Debt Repayments by the Nanyo Kogyo Koshi, Together with Resources for Debt Repayments (in yen, fractions rounded off)

	1925	1926	1927	1928
Proceeds of iron ore sales	3,315,000	3,285,000	4,460,000	6,287,100
Proceeds of manganese ore sales	495,600	920,000	950,000	841,500
Freightages, both ways	415,800	2,138,400*	206,000	237,000
Total	4,226,400	6,343,400	5,616,000	7,365,600
a. Batu Pahat mining office expenses	3,075,900	3,087,750	1,764,997	2,484,712
b. Kemaman mining office expenses	388,180	912,750	607,657	693,138
c. Shipping division ordinary expenses	397,848	2,138,400	2,655,748	3,572,000
d. Singapore branch ordinary expenses	58,800	152,500	83,819	93,223
e. Kobe business headquarters ordinary expenses	114,000	114,000	379,729	407,599
Total	4,034,778	6,305,400	5,491,949	7,250,672
<u>Balance</u> Profit for current year	191,622	38,000	124,051	114,928
<u>Repayments due current year</u>				
Principal & interest due to government		327,301	482,050	482,050
Principal & interest due to Taiwan Bank		78,700	66,308	64,151
Total		406,051	548,359	546,202
<u>Resources appropriated for repayments</u>				
Interest payable**		226,180	167,645	143,311
Depreciation expenses**		189,410	271,410	326,410
Including: Mining concessions		90,000	210,000	265,000
Ships		61,410	61,410	61,410
Current year profit		38,000	124,051	114,928
Total		415,590	563,105	584,650
<u>Balance</u> Surplus		9,539	14,747	38,448

Sources: Based on "Jigyo Yotei narabini Shushi Yosansho" or "Jigyo Yotei narabini Keijohi Yosansho" for every year from fiscal 1925 till 1928 (incorporated into Taisho Juyonen Nanyo Kogyo Koshi Kankei and Taisho Jugonen yori Showa Yonen ni itaru Nanyo Kogyo Koshi Kankei Shorui).

Notes: * Total of freightages received; "Although the shipping division was made self-sustaining with a change in budgetary form, it essentially remained incidental to the mining business, and accordingly all the calculations are based on actual costs." ** Included in the expenditure items a, b, c, d, and e above (the interest payable in 1927 and 1928 is included in e).

TABLE 16. A Balance Sheet of the Nanyo Kogyo Koshi (in thousand yen; fractions less than ¥1,000 rounded off)

	Sept. 30 1925	Mar. 31 1926	Sept. 30 1926	Mar. 31 1927	Sept. 30 1927	Mar. 31 1928
Assets						
Mining concessions	1,788	1,758	1,743	1,715	1,890	1,871
Real estate	8	8	8	8	8	10
Plants & buildings	59	59	66	79	92	97
Machinery	110	143	139	140	180	187
Ships	1,323	1,329	1,363	1,368	1,418	1,438
Furniture & fixtures	39	39	39	41	42	46
Spare stores	68	43	80	110	105	69
Bills receivable	-	-	15	-	-	-
Suspense payments	136	87	102	150	153	48
Accounts receivable	74	16	36	81	122	37
Ore	73	90	-	-	-	-
Bank accounts	88	42	115	165	173	126
Cash	18	31	7	9	9	9
Construction in process	235	266	206	208	-	-
Loss brought forward from previous term	9	-	-	-	-	-
Total	4,028	3,913	3,919	4,075	4,192	3,937
Liabilities						
Capital	250	250	250	250	250	250
Reserves	-	-	-	168	287	410
Debts	2,881	2,833	2,683	2,922	2,666	2,334
Deposits received	22	22	30	42	29	62
Bills payable	468	509	535	179	357	166
Correspondents' accounts	1	8	1	-	-	-
Arrears	326	242	331	418	539	539
Suspense receipts	41	32	61	52	16	54
Balance brought forward from previous term	-	-	-	-	12	30
Current term profit	39	15	28	45	37	93
Total	4,028	3,913	3,919	4,075	4,192	3,937

Source: Deposit Division, Ministry of Finance, Nanyo Kogyo Koshi Kankei Yuzukin ni kansuru Enkaku, 1928, pp. 21-23.

TABLE 17. An Operating Profit-and-Loss Statement of the Nanyo Kogyo Koshi (Ishihara Sangyo Kaiun)

	Mining division (silver dollars)			Total	¥ equivalent of same	Shipping div. (gold ¥)	Business div. (gold ¥)
	Batu Pahat	Kemaman (iron ore)	Kemaman (manganese ore)				
First half of 1928							
Revenue (total of ordinary account budget)	865,500	55,842	278,041	1,199,383	1,451,253	1,855,709	150,051
Expenditure (total of ordinary account settled)	870,490	58,951	300,279	1,229,720	1,487,961	1,730,654	119,215
Balance (current term profit/loss)	-4,990	-3,108	-22,239	-30,337	-36,708	125,055	30,836
Second half of 1929							
Revenue (total of ordinary account budget)	1,102,611	91,237	86,572	1,280,420	1,451,679	2,058,889	
Expenditure (total of ordinary account settled)	1,060,943	112,174	100,310	1,273,427	1,451,707	1,874,558	Unknown
Balance (current term profit/loss)	41,667	-20,937	-13,738	6,993	7,972	184,330	
Expenditure (estimated value of ore remaining at end of previous term)	6,609	23,149	5,421	35,179	40,104		
Revenue (value of ore actually shipped out in rainy season of current term)		25,986	11,515	37,501	42,751		
Revenue (estimated value of ore remaining at end of current term)		18,461	4,393	22,854	26,054		
Balance after counting above (net current term profit/loss)	35,059	361	-3,251	32,169	36,673		

Sources: The Nanyo Kogyo Koshi, Kozan-bu Gyomu Son'eki Keisansho, Sempaku-bu Gyomu Son'eki Keisansho and Eigyō-bu Gyomu Son'eki Keisansho (all for the first half of fiscal 1928). Ishihara Sangyo Kaiun Goshi Kaisha, Kozan-bu Gyomu Son'eki Keisansho and Sempaku-bu Gyomu Son'eki Keisansho (both for the second half of fiscal 1919).

Notes: Sums, both in yen and dollars, are rounded at the decimal point.
 Conversions into yen are made at rates of 1 Straits dollar = ¥1.21 for the first half of 1928 and 1 Straits dollar = ¥1.14 for the second half of 1929 (the 1928 and 1929 editions of Banking Bureau, Ministry of Finance, Ginko-kyoku Nempo were referred to).

APPENDIX TO TABLE 17. A Breakdown of the Ordinary Expenditure of the Mining Division, According to Accounts Settled (in Straits dollars)

	First half of fiscal 1928			Second half of fiscal 1929		
	Batu Pahat	Kemaman (iron ore)	Kemaman (manganese ore)	Batu Pahat	(iron ore)	Kemaman (manganese ore)
Mining offices						
Mining cost	(@0.905) 324,734	(@0.910) 12,619	(@1.895) 90.092	(@0.638) 306,389	19,456	28,186
Land conveyance cost		(@0.575) 7,974	(@0.608) 31,744		21,567	17,076
Water transport cost	(@0.842) 302,246	(@1.620) 22,582	(@2.087) 99,236	(@0.796) 381,981	34,618	19,269
Export duty	(@0.433) 155,327	(@0.500) 6,933	(@0.822) 39,082	(@0.418) 200,602	6,815	5,570
Business expenses	(@0.104) 37,226	(@0.530) 7,351	(@0.018) 29,406	(@0.090) 43,457	18,815	18,537
Interest	(@0.001) 194			(@0.001) 525	74	74
Insurance premium				(@0.070) 33,602		770
Miscellaneous loss or profit	[(@0.023) 8.082]	[(@0.014) 195]	[(@0.016) 781]	[(@0.008) 4,286]	2,122	2,122
Sub-total	(@2.262) 811,645	(@4,131) 57,265	(@6,073) 288,779	(@2,005) 962,269	103,467	91,604
Singapore branch						
Business expenses	(@0.093) 33,333	(@0.120) 1,667	(@0.140) 6,667	(@0.171) 82,010	7,236	7,236
Interest	(@0.002) 544	27	(@0.002) 109	(@0.001) 688	61	61
Insurance premium	(@0.070) 25,118	-	(@0.100) 4,755			
Miscellaneous loss or profit	[151]	[8]	[30]	(@0.033) 15,977	1,410	1,410
Sub-total	(@0.165) 58,845	(@0.120) 1,686	(@0.242) 11,500	(@0.205) *98,675	8,707	8,707
Total	(@2.427) 870,490	(@4,251) 58,951	(@6,316) 300,279	@2,210) 1,060,943	112,174	100,310

Sources: The same as Table 17 proper.

Notes: Bracketed figures are profits. Sums are rounded at the decimal point. (Unit prices are quoted exactly as stated in the original literature.) * Although the original literature gives a figure of 28,675, it is evidently wrong and accordingly corrected here.

the product of multiplication of the "budgeted unit price" (freightage per ton) by the "actually transported quantity," and its expenditure consists of the settled sums of individual items. Therefore, it is meaningless to compare the revenue and expenditure in this chart directly with those in Table 13 or 15. Table 17 indicates how the settled sums contrast with the sums initially budgeted (or allocated) for individual divisions.

According to this table, the revenue and expenditure of the shipping division were greater than those of the mining division. In the mining division alone, those of the Batu Pahat mining office were far greater than those of the Kemaman office and, as the appendix to Table 17 indicates, the former's production cost per ton of (Sri Medan) ore was much lower than the latter's (Machang Stawn). The production cost of the Kemaman office was increased by the additional (rail) conveyance cost and greater water transport (by barge) and business costs. The mining costs were about the same, and accounted for very small proportions of the overall production costs at both offices. The mining cost at Batu Pahat (Sri Medan) sharply fell off from the first half of 1928 through the second half of 1929, and correspondingly helped reduce the total production cost per ton.

Now, referring again to Tables 13 and 14, let us look at the business results from 1929 through 1933. In August 1929, the Nanyo Kogyo Koshi increased its capital six times, to ¥1,500,000, and renamed itself Ishihara Sangyo Kaiun Goshi Kaisha. Furthermore, the company purchased 7,000- to 8,000-ton class ships to expand its ore transport operations and thereby reduce the per-ton transport cost significantly. As a result, its semi-annual profit steadily increased, from ¥186,000 in the first half of 1929 to ¥200,000 and further to ¥311,000. The profit-to-capital ratio, too, remained as high as 27 per cent or even 42 per cent in spite of the sixfold increase of the capital. However, the profit rate began to fall off sharply in the second half of 1931, and the company even registered a deficit of ¥181,000 in the second half of 1932, in part as a result of Ishihara Sangyo Kaiun's launching of the Japan/Java shipping service, as referred to above, and participation in fierce competition

(cargo booking war through competitive cutting of freight rates) with traditional liner operators. The company tried to compensate for its enormous losses from the Java shipping service with its profits from mining operations for four semi-annual terms, from the first half of 1931 to the second half of 1932, but the loss in the latter half of 1932 seems to have been too great to absorb.⁷¹ Yet the mining-
shipping company improved its business performance in 1933, and chalked up high profit rates of 55 per cent in the first, and 31 per cent in the second half. The outstanding balance of its debts steadily decreased until the first half of 1933. Thus Ishihara Sangyo Kaiun punctually repaid its loan from the government (Deposit Division) and, although no documentary evidence is available as yet, seems to have fully refunded it by the end of fiscal 1933 (31 March 1934). As the final deadline of refundment was the end of fiscal 1939, the full clearance of the debt appears to have been achieved six years earlier than schedule.⁷²

As source of information on the period of Ishihara Sangyo Kaiun Goshi Kaisha, Kessan Hokōkusho [Reports on settlement of accounts] remains available, though some parts are missing. The balance sheets, profit-and-loss statements and statements of appropriation of surplus contained in these reports are compiled in Tables 18 (a) and 18 (b). Figures in these tables are consistent in some parts and inconsistent in others with those in Tables 13 and 14, and Table 18 (a) presumably succeeds Table 16. However, before analysing Table 18 (a) and 18 (b), there are some facts to be kept in mind regarding the organization of the company.

Before the change of the company's name to Ishihara Sangyo Kaiun Goshi Kaisha in August 1929, Ishihara Sangyo Goshi Kaisha (Ishihara Industrial Company, a limited partnership, capitalized at ¥200,000) was founded in June, the same year, with its head office located in Kyoto. This company was established to deal with the registration problem of the ships additionally purchased by the Nanyo Kogyo Koshi (Ishihara Sangyo Kaiun) ('to enable it to own ships registered in mainland Japan'). In July 1930, it was reorganized and renamed Ishihara Gomei Kaisha (Ishihara & Co., an unlimited partnership), increasing its capital to ¥2,500,000 at the same

TABLE 18 (a). A Balance Sheet of Ishihara Sangyo Kaiun Goshi Kaisha
(in thousand yen; fractions below ¥1,000 are rounded off)

	Sept. 30 1929	Sept. 30 1930	Sept. 30 1931	Mar. 31 1932	Sept. 30 1932	Mar. 31 1933	Sept. 30 1933
Debit (assets)							
Mining concessions	1,726	1,391	1,281	1,226	1,226	1,226	1,226
Ships	1,067	1,006	779	739	739	739	549
Miscellaneous ships	373	537	2	2	2	2	2
Real estate	10	17	8	8	8	8	8
Plant & buildings	116	192					
Machinery & tools	214	367					
Furniture & fixtures	55	72	35	36	35	36	42
Investments	100						
Loans	657	364	324	339	284	264	244
Securities			0	0	0	0	0
Spare stores	70	162	144	132	140	119	115
Bills receivable		63				54	
Suspense payments	64	211	267	242	94	392	92
Accounts receivable	22	995	587	65	948	12	260
Ore				918	255	444	144
Bank accounts	349	137	566	575	231	338	1,221
Cash	6	14	1	1	1	1	1
Loss brought forward from previous term					23	256	437
Current term loss				28	233	181	
Total	4,828	5,528	3,986	4,311	4,219	4,071	4,340
Credit (liabilities)							
Capital	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Reserves	36	392	400	400	400	400	400
Ship repair reserve			64	46	60	63	30
Debt	2,031	1,370	1,257	1,198	1,137	1,075	1,011
Correspondents' accounts			141	106	225	406	809
Bills payable	263	1,410	378	857	695	345	82
Arrears	617	185	51	69	38	60	47
Suspense receipts	62	30	16	42	60	89	112
Deposits received	133	126	78	89	103	133	139
Balance brought fwd. from previous term		204	34	5			
Current term profit	187	311	66				211
Total	4,828	5,528	3,986	4,311	4,219	4,071	4,340

Sources: Ishihara Sangyo Kaiun Goshi Kaisha, Dai Juhakkai Kessan Hokokusho [The 18th report of account settlement], and Taiwan Ginko (Okura-sho) Teisyutsu Kessan Hokokusho [Account settlement reports submitted to the Bank of Taiwan (Ministry of Finance)] for the 20th through 26th terms.

Notes: Materials for the 19th and 21st terms are missing. For the 18th term, there also is a report submitted to the civil administration authorities of Malaya besides that presented to the Bank of Taiwan, with discrepancies in figures and classification between the two, but the latter is used for this table with a view to continuity of information.

TABLE 18 (b). A Profit-and-Loss Statement and a Statement of Appropriation of Surplus of Ishihara Sangyo Kaiun Goshi Kaisha

Profit-and-Loss Statement (in thousand yen; fractions below ¥1,000 are rounded off)							
	Apr. 1 - Sept. 30 1929	Apr. 1 - Sept. 30 1930	Apr. 1 - Sept. 30 1931	Oct. 1 1931 - Mar. 31 1932	Apr. 1 - Sept. 30 1932	Oct. 1 1932 - Mar. 31 1933	Apr. 1 - Sept. 30 1933
Revenue							
Revenue from mining concessions			100	100	100	100	100
Proceeds of ((iron ore) ore sales ((manganese)	4,790 425	4,494 344	3,144 134	2,722	2,896 137	1,819 3	3,380
Freightages	174	179	485	492	635	1,067	1,390
Passenger fares					21	50	78
Charterages receivable			23	78	113	288	168
Interest receivable		1					
Miscellaneous profits		3	4	2	4	5	8
Current term loss				28	233	181	
Total	5,389	5,022	3,889	3,421	4,139	3,515	5,124
Expenditures							
Ore purchase prices	1,910 [*]	1,677 ^{**}	1,494	1,138	1,875	1,016	2,160
Freightages and in-surface premiums	1,160	716	310	58	275	139	308
Full expenses	347	457	596	603	557	692	717
Sailing expenses	644	644	765	899	516	544	603
Cargo and passenger expenses					339	505	475
Charterage payable	499	578	448	504	377	402	409
Business expenses	288	318	174	186	155	173	182
Interest payable	72		35	33	44	42	24
Exchange loss	2		0	0	2	1	0
Procurement expenses		46					
Depreciation expenses	243	274					14 ^{***}
Miscellaneous losses	37						
Current term profit	187	311	66				211
Total	5,388	5,022	3,889	3,421	4,139	3,515	5,124
Statement of Appropriation of Surplus (in thousand yen; fractions below ¥1,000 are rounded off)							
Balance brought over from previous term		204	34	5	-23	-256	-437
Current term profit	187	311	66	-28	-233	-181	211
Additions to reserves							400
Total	187	515	100	-23	-256	-437	174
Depreciation of mining concessions	66	55	55				220
Depreciation of ships	30	130	40				84
Balance carried forward to following term	90	330	5	-23	-256	-437	Δ130

Notes: * A total of mining cost (720), land conveyance cost (48), water transport cost (856) and export duty (286).

** A total of mining cost (683), land conveyance cost (42), water transport cost (706) and export duty (245).

*** A loss due to sinking of the Kinsen Maru.
Other notes and sources are the same as those for Table 18 (a).

time. According to Ishihara Jigyō Gaiyō, compiled in September 1930, in contrast to Ishihara Sangyo Kaiun, which retained only the three previously purchased ships (totalling 21,965 tons), Ishihara Gomei owned ten newly purchased vessels (81,668 tons). Ishihara Sangyo Kaiun considered all 13 ships (103,363 tons) as its shasen, and operated them together with four time-chartered ships (32,678 tons) and spot-chartered ones.⁷³

Another factor calling for attention in analysing the accounting documents of Ishihara Sangyo Kaiun is its relationship with Ishihara Sangyo Koshi, Ltd., in Singapore. Established in August 1925 under the laws of the Straits Settlements, Ishihara Sangyo Koshi succeeded the business of Ishihara Yōkō, the three Ishihara brothers' enterprise launched before the founding of the Nanyo Kogyo Koshi, and further "took over all the existing business activities of the Nanyo Kogyo Koshi in the South Sea region" (it was reorganized into a joint stock company and renamed Kabushiki Kaisha Ishihara Sangyo Koshi in September 1930, increasing its capital to 1,500,000 Straits dollars.⁷⁴) Thus there was established a division of labour under which Ishihara Sangyo Koshi in Singapore was responsible for exploitation of the iron mines in Sri Medan, Johore, and Machang Stawn, Trengganu (until loading of ore onto ocean carriers), and Ishihara Sangyo Kaiun for ocean transport and sales of ore. This division of labour, however, was only a nominal demarcation on the organization chart of the mining-shipping venture, and obviously the three companies, Ishihara Gomei Kaisha, Ishihara Sangyo Kaiun Goshi Kaisha, and Ishihara Sangyo Koshi, Ltd. (Singapore), all headed by Hiroichiro Ishihara as President, essentially constituted an integrated family business of the Ishiharas.⁷⁵

Keeping these circumstances in mind, let us now analyse Tables 18 (a) and 18 (b). The reason why the value of ships in the "Assets" section tended to decrease, in spite of the fact that Ishihara Sangyo Kaiun in the period under review substantially expanded its ore transport operations and launched a full-scale shipping venture, is that, as stated above, all the newly bought ships were registered in the name of Ishihara Gomei Kaisha and the initially purchased ships depreciated. Presumably the same applies to mining concessions. While the initial concessions in Sri Medan

and Machang Stawn were in the name of Ishihara Sangyo Kaiun, those subsequently acquired were registered in the name of Ishihara Sangyo Koshi, Ltd., overseas, and in that of Ishihara Gomei Kaisha in Japan.⁷⁶

The outstanding balances of debt are exactly the same as the corresponding figures in Table 14 above, manifesting a consistently decreasing trend. To analyse their composition according to the "General Inventory," the debt listed in Table 18 (a) consists entirely of the governmental loan. Here again it is confirmed that Ishihara Sangyo Kaiun punctually repaid the Deposit Division loan every year.

Next to look at the profit trend, while large profits are registered herein for the 18th (the first half of 1929) and 20th (that of 1930) semi-annual terms, as in Table 13, not only are the two charts inconsistent as to the profits in subsequent terms, but losses are recorded in Table 18 (b) for three consecutive terms from the 23rd (the second half of 1931) through 25th (that of 1932). The reason for this discrepancy has not been clarified. I will trace the profit trend, as observed in Table 18 (b), while referring to the details of revenue and expenditure.

The "proceeds of ore sales" in this chart is almost wholly derived from the Imperial Steel Works, and the "ore purchase prices" were paid to Ishihara Sangyo Koshi, Ltd. (Singapore).⁷⁷ As regards the "freightages and insurance premiums," the former were freightages for ore shipments carried by ships not belonging to the company, and the latter were paid for insurance of ore in transit. (The hull insurance premiums are included in the "hull expenses.")⁷⁸ To look at the trends of the "proceeds of ore sales," "ore purchase prices" and "freightages and insurance premiums" as a rough indicator of the ore trade performance (the "hull expenses" and succeeding items are disregarded here for the sake of convenience although they, too, are pertinent to ore transport), the three items are found to have quickly shrunk from the 22nd term (the first half of 1931) on as a result, above all, of the substantial decrease in sales proceeds, resulting from the aforementioned sharp drop in contracted quantity of ore supply to the Imperial Steel Works after the Showa panic and the cutback in contracted unit price. On the other

hand, the revenue from the shipping business, including freightages, registered growth, reflecting the company's increasing participation in the marine transport market. The "hull expenses," "sailing expenses," "cargo and passenger expenses" and "charterages payable" also showed a generally increasing trend, but not so markedly as the revenue from the shipping business. The balance of these shipping revenue and expenditure items obviously was in the red, but the red figures became smaller. Since no accounting documents of Ishihara Gomei Kaisha and Ishihara Sangyo Koshi, Ltd. for those terms are available,⁷⁹ no further scrutiny is possible, but, as far as one can tell from this chart, the decrease in profit and the turn into the red in 1931-1932 were largely attributable to the steep fall in proceeds of ore sales to the Imperial Steel Works. (The deficit in the shipping business could be explained by structural factors.)

At any rate, Ishihara Sangyo Kaiun, as stated earlier, improved its business performance and again achieved a high profit rate in 1933. In March 1934, it was reorganized into a joint stock company with a capital of ¥2,400,000 and renamed Ishihara Sangyo Kaiun Kaisha, Limited. After its reorganization, the company expanded its business into its homeland - operating mines including the Kishu mine (of copper and sulfide ore) and building a plant in Yokkaichi - and diversified its overseas operations into bauxite and tin mining (in the Philippines, Java and Hainan Island besides British Malaya). Its capital also was increased to ¥5,000,000 in the second half of 1934, and further to ¥20,000,000 in the first half of 1937.⁸⁰

POSTSCRIPT

As we have seen, the Nanyo Kogyo Koshi (Ishihara Sangyo Kaiun) achieved very smooth development, from the second half of the 1920s on. Certainly, in its early years, the mining company depended on financing by the Bank of Taiwan and on support by the bank's President and steel works' Director-General, and the subsequent state assistance in the form of a loan from the Deposit Division of the Ministry of Finance made immense contributions to its development. The prosperous business operations of the Nanyo Kogyo Koshi owed much to the circumstance that its exploitation of the Sri Medan iron mine in Johore, British Malaya, was in line with the "national policy" of the Imperial Steel Works, which had been seeking a new reliable source of iron ore in view of the increasing instability of supply from Chinese iron mines.

However, this state assistance alone cannot fully explain the commercial success of the iron-mining project by the Nanyo Kogyo Koshi. As we have seen, the ore deposit itself was in a readily workable form and, moreover, the reduction of the ore production cost per ton by improving the mining and conveyance methods and using a "line-flow" system from the mine to the ocean carrier deserves particular note. Furthermore, though helped by the colonial labour market situation in British Malaya, the successful management of local workers (by assignment of tasks according to race, through contractors) also was an important factor. The increasing ocean transport by the company's own fleet meanwhile made important contributions to the inexpensive and steady transport of ore. This self-transport of ore and the company's undertaking of general marine transport operations (based on this experience) is particularly noteworthy considering the ore transport situation after the Second World War (massive transport by specialized carriers).

The Nanyo Kogyo Koshi (Ishihara Sangyo Kaiun), while basically relying on state assistance, set itself on a track of commercial success by increasing its ore production (through improvement of the mining and conveyance systems) and expanding ore transport by its own fleet and thereby achieved high profit rates and steadily repaid its debt to the government (Deposit Division), in sharp contrast to Hanyehp'ing Yüfan Kungssu of China. I stated above that the Malay project was similar to the cases in China as far as the form of governmental financing was concerned. The repayment of the loan with interest was given priority in the appropriation of the proceeds of ore sales. From the government's (Ministry of Finance and Imperial Steel Works) perspective, the financing was a form of linked money lending and ore buying. However, there was a difference in the nationality of the companies receiving the loans: Chinese and Japanese. Although technical and accounting advisers were sent from Japan to Hanyehp'ing Kungssu, to place it under Japan's financial control, the Japanese were unable to reform its traditionally corrupt management, and instead met resistance by the Chinese (chiehkuan, confiscation and control) stimulated by an upsurge of nationalism. In contrast, the Nanyo Kogyo Koshi was established by the Ishihara brothers from virtually nothing, and developed iron mines from the very outset. Though financed by the government, the company was in no subordinate relation to it other than a general debtor-creditor relation. Therefore, in its eventual form, Ishihara's business practices closely resembled the development-import formula, by which a Japanese interest sets up a local venture to develop natural resources overseas and supplies Japan the resources so developed. (In this instance what directly matters is the financial position of the developing enterprise.) However, whether mining is undertaken by a money lending-ore buying formula or by a development-import system, it obviously is affected by local conditions. In this context, it deserves renewed note that the exploitation of Malay iron ore by The Nanyo Kogyo Koshi (Ishihara Sangyo Kaiun) was undertaken as a development project from its very beginning and, though in a British territory, was not subject to control by the British Government, and that it enjoyed friendly relations with the state government. In the developing process of the "resources-hungry" imperialism of prewar Japan, a plundering tendency generally prevailed, but the development of Malay iron ore by the Nanyo Kogyo Koshi

was one of a few exceptions to that general trend, at least until the mid-1930s. The plundering "development of the Southern region" based on the so-called "Greater East Asia Co-prosperity Sphere" concept of Japanese imperialism in and after the late 1930s, though heralded by the development projects of Ishihara Sangyo and others, seems to have represented a substantial degeneration of the earlier development pattern.⁸¹

Finally, I would like to conclude by pointing out that the increased import of Malay iron ore stimulated a transformation of production techniques at the Yawata Steel Works, to which the ore was delivered. Replacement of China by Malaya as the principal source of iron ore to the Yawata Steel Works did not just mean changes in import volumes from these areas or in suppliers. The difference in ore grade brought about a change in smelting techniques.

Table 19 shows the results of analysis of ores supplied to the steel works from major sources in fiscal 1927. According to the chart, the iron ore from Johore (Sri Medan) was an excellent product because it not only had the highest ferrous content (over 64 per cent), but also contained very little silicic acid and had only small sulphur and copper contents, both harmful to smelting, though it contained more phosphorus than other iron ores. The iron ore from Tayeh, though it was reputed to be a good product, was no longer so good at that time because it contained copper beyond the acceptable limit and its phosphorus content, though lower than that of many other ores, was higher than the standard level, with its sulphur content also rather high. That from T'aoch'ung, though favourable with respect to its sulphur, phosphorus, and copper contents, had a very high silicic acid content and was rather low in ferrous content. All iron ores from Korean mines contained much silicic acid, and that from Anak exceeded the acceptable limit of sulphur content, too.

Considering the implications of the replacement of China by Malaya as the principal source of iron ore in the light of these differences in grade, one can readily understand why the acid Bessemer process declined at the Yawata Steel Works. Because of the excessively high phosphorus content of the pig iron produced by the Yawata Steel Works for use in

TABLE 19. An Analysis of Iron Ores Supplied to the Yawata Steel Works
(in fiscal 1927)

	Descrip- tion of ore	Quantity supplied ('000 t)	Content in Fe					
			Fe (%)	Mn (%)	SiO ₂ (%)	S (%)	P (%)	CU (%)
Tayeh	Magnetic hematite	338	Δ60.37	Δ0.25	7.34	Δ0.250	Δ0.120	x0.610
T'aoch'ung	Hematite	170	Δ54.81	Δ0.17	Δ17.46	0.005	0.025	0.011
Johore	"	485	64.21	Δ0.18	1.34	0.012	Δ0.235	0.020
Iwōn	"	64	Δ53.30	Δ0.12	Δ18.94	0.001	Δ0.209	0.009
Anak	"	49	x46.34	Δ0.13	x22.87	x2.513	0.044	0.015
Chaeryong	Limonite	46	50.66	1.26	Δ13.63	0.003	Δ0.117	0.016
Unryul	"	47	51.21	2.12	Δ10.26	0.001	Δ0.123	0.012
Total or average (ore from other sources also counted)		Total 1,303	Av. 59.27	Av. 0.32	Av. 8.11	Av. 0.261	Av. 0.151	Av. 0.190

Notes: Supplies of no less than 40,000 tons each are listed.

Δ Above (or below for Fe and Mn) the standard contents in the appendix below.

x Beyond the acceptable limits in the appendix below.

Source: General Affairs Dept., Steel Works, Toyo Homen Shuyo Tekko Shirabe, 1929.

APPENDIX TO TABLE 19. Essential Purchase Standards at the Yawata Steel Works

	Standard content	Change in price according to deviation from standard content		Acceptable limit
		Deviation in content	Change in price (yen)	
Content in Fe {	Magnetic	65.00%		
	Fe Hematite	60.00	+100%	+0.1
	Limonite	50.00		
	Mn	0.50	+0.50	+0.1
	SiO ₂	10.00	+1.00	-0.05
	S	0.10	+0.10	-0.05
	P (%)	0.05	+0.01	+0.1
	Cu (%)	0.40	-	-
				Min. 50.00%
				" 40.00
				-
				Max. 20.00
				" 1.00
				" 0.25
				" 0.40

Source: The same as Table 19 proper.

acid Bessemer converters, Bessemer converters and (basic) open-hearth furnaces had been used in combination, but the former were finally suspended from operation at the end of November 1927. The first reason for the suspension was that the phosphorus content of iron ore charged into blast furnaces had so much increased that the pig iron produced was no longer suitable for use in acid bessemer converters.⁸² This circumstance, however, did not just imply the negative effect of the increased supply of ore from Johore (Sri Medan), Malaya: that continued operation of the acid concerters was made impossible. Rather, the increased use of Johore ore with a very small silicic acid content made it possible to produce low-silicic acid pig iron, most suitable for basic open-hearth furnaces. (In this case, a somewhat high phosphorus content poses no problem.) In spite of the requirement for establishment of techniques for production of low-silicic acid pig iron to cope with the increasing demand for such pig iron for use in steel-making by the basic open-hearth process, the Japanese steel industry in general found it difficult to establish such techniques, but Yawata is said to have somehow succeeded in this attempt in or around 1924.⁸³ It seems no exaggeration to say that the increased supply of ore from Johore, Malaya, was partly responsible for the establishment of this pig iron-making technology and changes in pig iron and steel-making methods.⁸⁴

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NOTES

1. Ken'ichi Iida, "Origin and Development of Iron and Steel Technology in Japan" (United Nations University, HSDRJE Series, Sub-project on Iron and Steel Industry and Transportation), 1979.
2. The Nanyo Kogyo Koshi (South Sea Mining Co., established in 1920) was successively reorganized into Ishihara Sangyo Kaiun Goshi Kaisha (Ishihara Industrial and Shipping Company, a limited partnership) in 1929, Ishihara Sangyo Kaiun Kaisha, Limited (a joint stock company), in 1934 and Ishihara Sangyo Kaisha, Ltd. (Ishihara Industrial Co., Ltd.), in 1943.

The current Ishihara Sangyo Kaisha, Ltd., is a chemical manufacturer. It is one of the world's biggest producers of titanium oxide, and a leading manufacturer of agricultural chemicals in Japan, capitalized at ¥6,950 million, with its headquarters in Osaka and a factory in Yokkaichi. It is no longer involved with iron mining; it is no longer engaged in domestic mining of nonferrous metals, such as copper, either.
3. Shoichiro Sato, "Seitetsu Genryo Shakkan ni tsuite no Oboegaki" [A memorandum concerning loans related to iron-making materials] (Toshi Seido Shigaku, No. 32, 1966); Minoru Ando, Nihon no Taika Zaisei Toshi (Japan's Public Investments In China) 1967; etc.
4. Bunji Nagura, "Kan'ei Yawata Seitetsusho ni yoru Tekkoseki no 'Antei-teki' Kakuho-saku" [Measures taken by the Imperial (Yawata) Steel Works to secure a "steady" supply of iron ore] (Ibaraki University Seikei-gakkai Zasshi, No. 33, 1974); Nagura, a supplement to the same journal, no. 41, 1979).
5. In my "'Antei-teki' Kakuho-saku" cited above, I also noted the quick increase in dependence on Malay iron ore. The present paper amplifies this observation, concentrating on mine development activities by the Nanyo Kogyo Koshi, complemented by the results of new research and analyses.
6. Major iron mines in British Malaya were scattered in the unfederated states of Johore, Trengganu, and Kelantan, and the federated state of Pahang. Thus, the main iron deposits in Malaya were found to the east of the Kerbau Mountains, which longitudinally divide the peninsula. (It was not until after the Second World War that the Ipoh mine in the state of Perak began to be developed on a large scale.)

All these deposits were metasomatic or residual deposits formed in the shale or quartzite of the Triassic period. It is believed that the primary deposits experienced the intense weathering (katamorphic) effect of the tropical climate, with its high humidity and heavy rainfall, and thereby turned into high-grade iron ore, with an iron content of more than 60 per cent, reaching levels as high as 68 per cent. The deposits consist primarily of hematite, and include some limonite and magnetite. As they are exogenetic altered deposits attributable to external forces, these deposits develop extensively in the near-surface strata, but usually fail to reach deep subterranean layers. Their erosion by wind, rain, and tremendous heat results in the accumulation of ore lumps at the foot of mountains, so-called detrital deposits.

This note is based on Toa Kenkyujo, Nampo Sho-chiiki no Tekko [Iron mines in southern areas], Part 1 (1941), pp. 11-15, and Part 2 (1943), p. 2; Eisuke Ishikawa, "Marai no Tetsu" [Malay iron] (Nihon Kogyokai-shi, No. 684, April 1942), p. 19; Toshiharu Otani, Marai no Keizai Shigen [Economic resources of Malaya] (Ministry of Commerce and Industry and Ministry of Agriculture and Forestry, ed., Nampo Keizai Shigen Soran, Vol. VI), 1943, p. 306; Toru Kumamaru, Nippon Seitetsu to Tekko Shigen [Japanese iron and steel and iron ore resources] (Secretariat of the Japan Iron and Steel Co., Ltd., Corporate History Editing Committee), 1959, pp. 301-323; etc.

7. Although inconsistent with the data of this table, figures on overall exports and exports to Japan alone are given in Nampo Sho-chiiki no Tekko cited above, p. 75, according to which exports to areas other than Japan totalled less than 300 tons a year at most (consisting of samples).

Malaya was well known as a major supply source of rubber and tin. In 1936, for instance, these two items combined accounted for more than 70 per cent of British Malaya's total exports (\$627,761,000). Rubber accounted for 48.3 per cent (\$303,315,000), tin's share was 22.5 per cent (\$141,353,000), while iron ore accounted for only 1.0 per cent (\$6,305,000) of total exports. However, the relative proportion of iron ore in Japan-bound exports was considerably higher. Total Japanese imports from Malay equalled \$48,207,000. Rubber was the biggest import, at 49.7 per cent (\$23,967,000) of Japanese imports, but iron ore was ranked second, with a 13.1-per-cent proportion (\$6,302,000), surpassing tin's 11.0 per cent (\$5,101,000). Benzine and other petroleum products also held an important position among Japan-bound export items. East Asian Economic Research Bureau, South Manchuria Railway Co., Ltd., ed., Eiryō Mare [British Malaya] (Nan'yo Sosho, Vol. III) 1938, p. 250.

8. The Dungun iron mine had previously been owned by the sultan of Trengganu, and was acquired by Kuhara Mining Co. (predecessor of Nippon Mining Co.) in 1917, before Hiroichiro Ishihara discovered and began to exploit the Sri Medan mine in Johore. However, as the British authorities subsequently reformed their administrative organization, Kuhara Mining renewed its application for a prospecting right in 1924 and that for a mining concession in 1926, both of

which were approved. "As it so happened that an iron mine was developed in Johore and seemed promising," in 1926 Kuhara Mining requested the Yawata steel works to survey the mining lot. The survey findings indicated good prospects. Accordingly, in the following year, Kuhara contracted with the steel works to supply the latter with 250,000 tons of iron ore a year, and started full-scale mining operations. Kuhara was succeeded by Nippon Mining in 1929; production began in 1930. This note is based on Nippon Mining Co., Ltd., Gojunen-shi [A 50-year history], 1957, p. 693; Nippon Seitetsu to Tekko Shigen, cited above, p. 305. As regards the Dungun mine, Koichi Fujimura, "Marai Hanto Ryu'un Tetsuzan ni tsuite" [On the Dungun iron mine in the Malay Peninsula] (Nippon Kogyokai-shi, No. 595, November 1934) and Nippon Mining Co., Ltd., "Zungun Tetsuzan no Gaiyo" [An outline of the Dungun iron mine] (the same journal, No. 684, April 1972) were also referred to.

9. Practically no detailed study has ever been made on the Malay iron mine development projects launched by Ishihara, in spite of their importance to the steel industry of prewar Japan. Especially the blast furnace operation of the Yawata steel works (both under state management and after its incorporation into Japan Iron & Steel Co., Ltd.) must have been critically dependent on the iron ore supply from Malaya, but surprisingly little mention is made of these projects in the histories of the works: Yawata Iron & Steel Co., Ltd., Yawata Seitetsusho Gojunen-shi [A 50-year chronology of the Yawata steel works], 1950; Japan Iron and Steel Co., Ltd., Corporate History Editing Committee, Nippon Seitetsu Kabushiki Kaisha-shi [A history of Japan Iron and Steel Co., Ltd.], 1959; etc. This absence of reference to Malay iron ore may perhaps reflect the optimism prevailing as to raw materials supply when these histories were written. What seem to be the only pieces of literature on the history of the Japanese steel industry in which Malay iron ore is referred to in reasonable detail are Vol. III-4 (1950) and Vol. V-9 (1953) of Nihon Tekko-shi Hensankai, Nihon Tekko-shi [A history of iron and steel in Japan].

Incidentally, encouraged by the commercial success of his iron-mining projects in Malaya, Hiroichiro Ishihara was also active from the 1930s on as a unique ideologue advocating development of the southern region and "renovation" of domestic politics in Japan, but I will stay away in the present study from this aspect of his activities, which has been covered relatively extensively in other works, and merely recommend reference to Ken Ito, Nekketsuji Ishihara Hiroichiro [Hiroichiro Ishihara, a man of hot blood], Tokai Shuppansha, 1939; Noboru Yano, "Nanshin" no Keifu [The genealogy of "southward expansion"], Chuo Koronsha, 1975; Hajime Shimizu, "Ishihara Hiroichiro ni yoru 'Nanshin' no Ronri to Shinri" [The logic and psychology of "southward expansion" according to Hiroichiro Ishihara]; Kenichiro Shoda, ed., Kindai Nihon no Tonan Ajia-kan [Modern Japanese views of Southeast Asia], Institute of Developing Economies, 1978; etc.

10. The Sri Medan mine was located about 22.3 miles (36 km) up the Batu Pahat River and its branch Sungei (river) Shimpan Kiri from Batu Pahat, Johore, and on the left side of the latter, only about 500 metres from the river bank. It mainly yielded good porous hematite with few impurities, such as silicic acid (though sometimes containing soft, coarse grains, which tended to pulverize). The estimated exploitable deposits, according to engineer Teikichi Tagami of the Imperial Steel Works, increased every time he surveyed the mine; from 7.2 million tons in 1920 to 8 million tons in 1921 and increased to 8.56 million tons in 1923. In 1922, Takeshi Ichimura of Mitsubishi Iron Co. estimated the deposits to total 10 million tons. This note is based on data from the General Affairs Department of the Imperial Steel Works, Toyo Homen Shuyo Tekko Shirabe [A survey on major iron mines in the Orient], 1929, pp. 173-174, and Takeshi Ichimura, "Marai Hanto Tekko ni tsuite" (full title: Marai Hanto Trengganu-shu Machang Stawn no Tekko to Johore-shu Batu Medan no Tekko ni tsuite [On the Machang Stawn iron mine, Trengganu state, and the Batu Medan iron mine, Johore state, in the Malay Peninsula]) (Chosen Kogyokai-shi, June 1922). Such already cited works as Nampo Sho-chiiki no Tekko, Part 2 (1943), pp. 6-7; Ishikawa, "Marai no Tetsu", p. 212; and Nippon Seitetsu to Tekko Shigen, pp. 317-319, together with Nampo ni okeru Tekko Shigen ni tsuite [On iron ore resources in the south], 1937, pp. 25-27, were also referred to.

Incidentally, Sri Medan (meaning "the field of light"), which had previously been known as Batu Medan ["the field of stones"], was so renamed by the Sultanate of Johore, on the first anniversary of the founding of the Nanyo Kogyo Koshi, with wishes for its future prosperity, according to Ishihara Sangyo Kaisha, Ltd., Sogyo Sanjugonen o Kaiko shite [Looking back on our 35-year history], 1956, pp. 35-36.

11. Ishihara Sangyo Kaiun Kaisha, Ltd., Sogyo Nijunen-shi [A 20-year history of our business], 1941, pp. 3-9, and the above-cited Sogyo Sanjugonen o Kaiko shite, pp. 6-14.

The conclusion of a survey report on the Sri Medan (Batu Medan) iron mine by an engineer of the Imperial Steel Works deserves quoting here: "This iron mine has an ore deposit of at least seven million tons, and yields ore of rare quality, which can be dug and taken out with comparative ease. Therefore it can be considered an excellent iron mine. As the ore would cost about ¥5 to excavate, and ¥13-14 to transport, or altogether some ¥20 to deliver to Yawata, it would accordingly be no exaggeration to say that this ore is very inexpensive; an equal source could hardly be found elsewhere, unless a suitable iron mine is discovered domestically or in China" (Teikichi Tagami, an imperial steel works engineer, "Johore-shu Batu Medan Tetsuzan Tosa Hokokusho", March 1920, incorporated into Taisho Jusannen Nanyo Kogyo Koshi Kankei [Concerning the Nanyo Kogyo Koshi, 1924]). This last-cited publication, which will be frequently referred to in the rest of my paper, is only a part of an enormous collection of documents (at present belonging to Komaza University, Tokyo) compiled by the Imperial Steel Works.

12. Deposit Division, Ministry of Finance, Nanyo Kogyo Koshi Kankei Yuzukin ni kansuru Enkaku [Circumstances concerning the loan to the Nanyo Koshi], 1928, pp. 1-3 and Reference 1. Since it is stated in a paper appended to these documents entitled "A written acknowledgement concerning the delivery of iron ore at the Johore Coast" that "if delivery at the Johore coast is required, the free overside price off the mouth of the Batu Pahat River shall be ¥5.50 for fiscal 1920 (to be yearly agreed upon for 1921 and subsequent fiscal years)," it seems that the price of ore was set on a free overside basis at Batu Pahat estuary for fiscal 1920. In the above-cited Sogyo Nijunen-shi, p. 10, and Sogyo Sanjugonen o Kaiko shite, p. 14, the contracted quantity is stated as 50,000 tons for 1921 (perhaps the calendar year), 100,000 tons for 1922 and 100,000 tons or more for every subsequent year.
13. See the provisional clause of Article 1, and Article 10.
14. Nanyo Kogyo Koshi Kankei Yuzukin ni kansuru Enkaku cited above, p. 2.
15. Sogyo Sanjugonen o Kaiko shite cited above, pp. 16-20.
16. The Bank of Taiwan history-editing section, Taiwan Ginko-shi [A history of the Bank of Taiwan], 1964, p. 420. In Nihon Keizai Shimbun-sha, ed., Watashi no Rirekisho [My personal history], Vol. XXII, 1964, p. 22, and Hiroichiro Ishihara, Hachijunen no omoide [Recollections of my 80 years], 1970, p. 47, Matsukata is alleged to have offered 25,000 shares in Kawasaki Dockyard as security, but this figure apparently is too large. Incidentally, according to Taiwan Ginko-shi, p. 420, the Bank of Taiwan's loan initially was not quoted in yen, but was in a sum of 800,000 Straits dollars, of which 250,000 Straits dollars was refunded by the end of 1922 and the remaining 550,000 Straits dollars, translated into ¥650,000, was transformed into a loan from another financial institution, Toyo Takushoku, acting on behalf of the Bank of Taiwan.

The Bank of Taiwan not only financed the initial expenditure for the Nanyo Kogyo Koshi, but also allocated working funds to the mining company, in the form of buying documentary bills for its ore shipments, to facilitate its fund-raising (Kisaku Nagura, Taiwan Ginko Yonjunen-shi [A 40-year chronology of the Bank of Taiwan], 1939, p. 269).
17. The above-cited Sogyo Nijunen-shi, p. 12, and Sogyo Sanjugonen o Kaiko shite, p. 21.
18. The above-cited Sogyo Nijunen-shi, pp. 14-17, and Sogyo Sanjugonen o Kaiko shite, pp. 24-29.
19. British Malaya consisted of three parts, each governed in a different form from the others: the Straits Settlements, Federated Malay States, and Unfederated Malay States. The Straits Settlements was a Crown Colony directly ruled by a British Governor. Each state, whether federated or not, had its Sultan, who represented the state government. (The Federated States had a federal legislature, in addition to

the legislatures of each individual state.) However, every state, again whether federated or not, had a British adviser, and supreme authority was vested in the Governor of the Straits Settlements in his concurrent capacity as High Commissioner; see: Eiryō Mare cited above, pp. 35-45, Toa Kenkyūjo, Nampo Tokei Yoran [A handbook of statistics on the southern region], Vol. 1, 1942, p. 158, etc. Thus the Malay states were fundamentally under the political and economic control of Britain, but everyday administration was entrusted to state governments, except in what the British considered critical situations. This situation seems to explain why the state governments of Johore and Trengganu were able to grant iron mine prospecting concessions at their own discretion. In these states, perpetual leases, mining rights, superficies, and other similar rights were granted to aliens as well as to nationals (Hiroichiro Ishihara, "Nan'yo ni okeru Tekko Shigen" [Iron ore resources in the South Sea region], Nippon Kogyokai-shi, No. 500, December 1926). Under the mining law of British Malaya, unlike under its Japanese counterpart, superficies and mining rights were inseparable from each other (Hiroichiro Ishihara, "Nan'yo no Kogyo" [Mining in the South Sea region], Nan'yo Kyokai Zasshi, Vol. XVII, No. 2, 1930).

20. See Nampo Sho-chiiki no Tekko, Part 1, p. 5, and Part 2, p. 2. The statement by Koichiro Ishihara that Malay iron ore "can be safely supplied to Japan in time of peace" (my emphasis) was full of implications (Hiroichiro Ishihara, "Waga Seitetsu Genryo Tekko Kyokyo no Shorai wa Yuryo no Yo Nashi" [There is no need to worry about the future supply of iron ore to our steel industry], Tetsu to Hagane, Vol. XII, No. 9, 1926).
21. This remarkable progress in the early phase of development was achieved on a crash basis. Several Japanese supervisors urged some 300 Chinese and Malay labourers to work from six o'clock in the morning until eight in the evening, seven days a week, for four months. As the fund allocated by the Bank of Taiwan (the second ¥300,000 instalment) was used up in the meantime, wage payments were postponed until the time of the first shipment, and food and alcoholic drinks were provided to the workers instead (according to Sogyo Sanjugo-nen o Kaiko shite cited above, pp. 29-34).
22. On the Nanyo Kogyo Koshi a year after its founding, the Japanese consul-general in Singapore reported: "To list noteworthy items among its existing facilities and equipment, there are four small steam boats, five motor boats, 32 (60-ton capacity) barges for conveyance of ore, two miles of rails laid, 100 trucks, warehouses, housing and a hospital. This steady progress of installation in spite of the short period of time that has passed since the founding [of the mining company] deserves admiration." (Goji Ukita, Japanese consul-general in Singapore, "Goshi Kaisha Nanyo Kogyo Koshi no Jigyō" [Business activities of the Nanyo Kogyo Koshi], 29 October 1921, addressed to Foreign Minister Yasuya Uchida, incorporated into Taisho Jusannen Nanyo Kogyo Koshi Kankei, cited above.

23. Sogyo Nijunen-shi cited above, p. 18. These figures are taken on a fiscal year basis, and accordingly differ from the corresponding figures in Table 4 above (many of the latter are too small).
24. In 1922 or 1923, Hiroichiro Ishihara planned a Japan-Dutch joint steel-making venture in Sumatra with iron ore from Sri Medan, where his mining enterprise was well under way, and coal from the Mearaenim mine (directly operated by the Dutch Government) in Palembang, Sumatra, but his plan was frustrated by the Great Kanto Earthquake of 1923 (the above-cited Sogyo Sanjugonen o Kaiko Shite, pp. 55-68, and Hachijunen no Omoide, pp. 65-73). For a description of and comment on this plan, see Bunji Nagura, "Maboroshi no Nichi-Ran Goben Sumatra Seitetsu Jigyo" [The phantom Japan-Dutch joint steel-making venture in Sumatra] (in the Kinzoku journal, January 1980).
25. According to Sogyo Nijunen-shi cited above, p. 18, the iron ore price in Japan fell off sharply from ¥25-¥35/ton in 1919 to ¥12.50/ton. This drop was reflected in the accord on delivery price between the Nanyo Kogyo Koshi and the Imperial Steel Works. The contracted per-ton price on an ex-steel-works basis declined from ¥20 in 1920 to ¥11.10 in 1921 and ¥10.80 in 1922 (all fiscal years). (See Table 8 on p. 23).
26. The Machang Stawn mine was located about 4.5 miles (a little over 7 km) up the Kemaman River from Sungei Pinan, which is situated about 13 miles up river from its mouth, and about 300 metres from its left bank. The mine was surrounded by tropical jungle, marshy and inhabited by ferocious beasts and venomous snakes. The deposit consisted of iron ore and manganese ore (to be more accurate, manganic iron ore). The iron ore was in the form of large and small irregular bodies, some of which were disintegrated into large and small lumps and debris, or had moved and concentrated into a residual deposit. The ore was a somewhat porous and coarse hematite of good quality, containing little silicic acid and having a high ferrous content, but its overall quantity was small (the exploitable deposit was 3.5 million tons according to the survey by engineer Tagami in 1923, or one million tons as estimated by Tagami and sub-engineer Kumamaru in 1926). This note is based on information contained in Toyo Homen Shuyo Tekko Shirabe; Ichimura, "Marai Hanto Tekko ni tsuite," both cited above, among others.
27. Deposit Division, Nanyo Kogyo Koshi Kankei Yuzukin ni kansuru Enkaku cited above, pp. 3-4 and Reference 3. Incidentally, Kojiro Matsukata, who concurrently was President of Kokusai Kisen (International Steamship Co.), disapproved of the plan of the Nanyo Kogyo Koshi to undertake independent ocean transport of its product (on the grounds that a marine transport venture with its own ships would prove precarious and ore transport should rather be commissioned to a specialized shipping firm), withdrew his credit guarantee to the Bank of Taiwan for ¥750,000, and returned his share in the iron mine to the Nanyo Kogyo Koshi (Sogyo Sanjugonen o Kaiko shite cited above, p. 43). In this connection, the loan from the Bank of Taiwan was henceforth repaid out of that from the Deposit Division. (See Table 6.)

28. Reference 4 of Deposit Division, Nanyo Kogyo Koshi Kankei Yuzukin ni kansuru Enkaku cited above. Also incorporated into Taisho Jusannen Nanyo Kogyo Koshi Kankei cited above.
29. The Kemaman (Machang Stawn) iron mine was discovered in 1918 by local explorers. Encouraged by Ishihara's successful development of the Sri Medan mine, a Japanese resident in Kemaman, Sakuji Sato, acquired mining rights and tried in vain to develop the mine (the above-cited Sogyo Sanjugonen o Kaiko shite, p. 45, Nampo Shochiiki no Tekko, Part 2, p. 13, etc.). Ishihara then purchased this mine. What deserves particular note in this connection is that the Imperial Steel Works, intending to "secure raw material supply" with the two iron mines, was in favour of a "merger of the two iron mines" (more specifically, the purchase of the Kemaman mine by Ishihara). The Director-General of the steel works, "Marai Hanto Tetsuzan ni kansuru ken" (Re iron mines in the Malay Peninsula), 6 June 1924, addressed to Foreign Vice-Minister Tsuneo Matsudaira (incorporated into Taisho Jusannen Nanyo Kogyo Koshi Kankei cited above).
30. See Note 28.
31. The contract between the Bank of Taiwan and the Nanyo Kogyo Koshi for a loan of ¥3 million (dated 2 June 1924) and the approval of the Minister of Finance concerning the allocation of the funds by the Deposit Division (dated 4 June 1924), both incorporated into the above-cited publication of the Deposit Division, Ministry of Finance, and also into Taisho Jusannen Nanyo Kogyo Koshi Kankei, cited above.
32. Bunji Nagura, "Kan'ei Yawata Seitetsusho ni yoru Tekkoseki no 'Anteiteki' Kakuho-saku," cited above. Whereas the "steel-making material fund" plan originated from the opinion of the director-general of the steel works (expressed in a document dated 29 April) and a proposal to establish a fund to finance development of raw material resources for iron-making (made in May 1924 to the Minister of Finance and the Minister of Agriculture and Commerce; incorporated into Showa Zaiseishi Shiryo [Materials on the history of national finance in the Showa period], 5-153, which is in the possession of the Ministry of Finance), the following statement in "Seitetsu Genryo Kakutoku ni Yosuru Shikin no Ken" [Re the fund needed for acquisition of steel-making materials] dated from 21 May (prepared by the Ministry of Finance, incorporated into Showa Zaiseishi Shiryo cited above): "It should be made an absolute requisite that the steel works establish a definite policy concerning fund-raising for future procurement of steel-making materials before demanding that the Deposit Division reduce the interest rate on the outstanding loan to Hanyehp'ing, grant an additional loan thereto and finance the planned purchase of the Trengganu mine." Thus, at that time, the Ministry of Finance considered it necessary to have a basic policy formulated concerning the "steel-making material fund" before granting an additional loan to Hanyehp'ing Kungssu or funds to the Nanyo Kogyo Koshi. However, when the lending of ¥3 million was approved early in June, according to "understandings between the Director-General of the steel works

and that of the Financial Bureau (of the Ministry of Finance)" (put into a document dated 4 June, also incorporated into Showa Zaisei-shi Shiryo, 5-153, and Taisho Jusannen Nanyo Kogyo Koshi Kankei, both cited above), it was agreed that, in the event of a delay in presentation to the Diet or enactment of "the bill concerning a special account for the steel-making material fund," at least two of the five ships the Nanyo Kogyo Koshi was planning to buy should be purchased by the steel works out of its own budget, and the mining company should (partly) refund its loan from the Deposit Division with the proceeds from the sale of the ships. A compromise was reached in this manner to enable the decision to allocate the Deposit Division funds to the Nanyo Kogyo Koshi in advance of the pertinent legislation.

33. Deposit Division, Nanyo Kogyo Koshi Kankei Yuzukin ni kansuru Enkaku cited above, pp. 6-11 and References 5-16.
34. A recollection of Kojuro Nakagawa, then President of the Bank of Taiwan (in Sogyo Nijunen-shi cited above, at the end of the volume).
35. Deposit Division, Nanyo Kogyo Koshi Kankei Yuzukin ni kansuru Enkaku, pp. 6-7 and References 6-8.
36. The following descriptions of the mining and conveyance process owe much to oral information provided by former senior executives of Ishihara Sangyo Kaisha, Ltd., at its headquarters (in July and October 1979; hereafter referred to as "oral communication").
37. "Since it is easier and less costly to collect this debris than to exploit the iron ore at the top, we have altered the initial plan and are carrying on our mining operation by picking up the debris on the slope for the time being." (Teikichi Tagami, an engineer of the steel works, "Sri Medan Tetsuzan Hokokusho" [A report on the Sri Medan iron mine], March 1921 (incorporated into Taisho Jusannen Nanyo Kogyo Koshi Kankei cited above). According to Ichimura, "Murai Hanto Tekko ni tsuite," cited above, in mining the detrital layer "the iron content per tsubo (= ca. 3.3 square metres) sometimes even surpassed 10 tons."
38. Ishihara Sangyo Sanjugonen-shi (A 35-year history of Ishihara Sangyo) (a draft), preserved at the head office of Ishihara Sangyo Kaisha, Ltd. This material is a rough draft of Sogyo Sanjugonen o Kaiko shite cited above, and shall be hereafter referred to as Sanjugonen-shi (draft).
39. Also known as the draw hole system. By this system, dug-out ore is dropped through a chute into a wagon underneath.
40. "Although ten rock drills, air compressors, and gas engines have been bought for use in mining operations, they are not needed for the time being because of the above-mentioned state of the mine" (Tagami, "Sri Medan Tetsuzan Hokokusho" cited above).

41. "In digging the main ore body, electric power was generated by a 300-HP and a 200-HP diesel engine, and two 100-HP compressors were used to drive many rock drills, all contributing to gradual rationalization." "Earth-moving, too, was mainly achieved by hand at first, but massive earth-moving in the main ore body area used two 27-sai* 50-HP diesel engine-driven shovels and an electromotive shovel of the same capacity. Ore-carrying wagons also were successively improved, and in the meantime about 200 wooden and tipping wagons, ranging in capacity from 18 to 27 sai, came into use." (Sanjugonen-shi (draft) cited above.) Though it is not known exactly when, the full-scale introduction and use of machinery reportedly began with the completion of the power station (in or around 1931). All the machines used in those days, including rock drills, were British products (made by Ingersoll and others) according to oral communication.
42. The above-cited Sanjugonen-shi (draft) and Toyo Homen Shuyo Tekko Shirabe, p. 175. The following descriptions of the conveyance systems at the time of inauguration (early in 1921), in or around 1930, and in the peak period (around 1935) may be of interest.
- "To facilitate conveyance of ore, two-foot wide double tracks of 12-pound rails were laid from the upper and lower stages and the foot of the hill to the pier, and the lower stage and the foot of the hill were linked by an automatic incline." (Tagami, "Sri Medan Tetsuzan Chosa Hokokusho", March 1921, cited above.)
- "For conveyance of ore, the capacities of wagons, fed by chuting through shafts and pockets from various stages by way of inclines, were fully utilized, and six sets of revolving steel-cable inclines were installed to facilitate ship loading on the new canal and at the pier." (Ishihara Jigyo Gaiyo, September 1930, cited above.)
- "To describe the conveyance equipment in the peak period of 1935, the ore from the northern area of the detrital layer and a part of that from the main ore body area were concentrated either directly or by ore tub onto the top of the continuous systems. There were three continuous systems used for further concentrating the ore onto the canal pier: No. 1, about 500 metres long, having a daily natural winding-down capacity of 500 tons; No. 2, about 500 metres long, having a daily natural winding-down capacity of 500 tons, and No. 4, about 1,000 metres long, having a daily winding-up-and-down capacity of 1,000 tons. The ore, mainly from the main ore body area, was then carried by the No. 5 continuous system (about 1,500 metres long, having a daily winding-up-and-down capacity of 1,500 tons) from the canal pier to the so-called old pier, where it was loaded on barges." (Sanjugonen-shi [draft] cited above.)
43. Sanjugonen-shi (draft) cited above. Incidentally, according to Ishihara Gomei Kaisha, Ishihara Sangyo Kaiun Goshi Kaisha, K.K. Ishihara Sangyo Koshi and Nangoku Mokuzai K.K., Ishihara Jigyo Gaiyo, September 1930, as a result of the completion of the canal pier, not only was the loading capacity increased, but also "the increase or decrease

* Sai = cubic shaku (1 shaku is about equal to 1 foot).

in water flow during the rainy season no longer affected the loading capacity."

44. Oral communication. Barge transport to the ocean carrier at anchor about three sea miles off the estuary was carried out when the tide was in the favourable direction. Loading of ore onto the ocean carrier was accomplished with cargo-handling baskets, each holding about 1.5 tons. Cargo handling at first was done on a small scale, but in the peak period the daily loading capacity ranged from 2,000 to 2,500 tons. Altogether 15 tugboats, of 15 to 100 HP in power, and 60 barges, of 80 to 120 tons in capacity, were used, according to Sanjugonen-shi (draft) cited above.
45. These efficient ways of mining and conveyance by the use of the glory hole and continuous systems attracted the attention of interested parties, and Japanese engineers often visited and inspected the mine on their way home from Europe or elsewhere (oral communication). The state of the Sri Medan iron mine in those days is also described in a travelogue by poet Mitsuharu Kaneko, who wandered in and around the Malay Peninsula from 1928 to 1932 (Mitsuharu Kaneko, Mare Ran'in Kiko [A travelogue of Malaya and the Dutch East Indies], 1st ed. in 1940, the pocket edition by Chuo Koronsha, 1978, pp. 92-107).
46. Oral communication.
47. The Kemaman (Machang Stawn) mine was handicapped, compared with the Sri Medan mine, in that loading of its product onto ocean carriers was virtually impossible in the rainy season (from December till March) and because transport by a light railway was required for a distance of four to seven miles (six to eleven km) from the mine to Sungei Pinan, but it was generally similar to the Sri Medan mine in other aspects of mining and conveyance. For this reason, and also because it was far smaller than the Sri Medan mine, it does not deserve any more detailed description (the above-cited Sogyo Nijunen-shi, p. 46, and Sogyo Sanjugonen o Kaiko shite, p. 48). For further details, see "Trengganu Kemaman Mangan-ko Shisatsu Hokokusho" [An inspection report on the Kemaman manganese mine, Trengganu] (incorporated into Taisho Jusannen Nanyo Kogyo Koshi Kankei), the Nanyo Kogyo Koshi, "Nanyo Kogyo Koshi Kemaman Hokokusho" [A report on Kemaman by the Nanyo Kogyo Koshi], 12 April 1925, "Marai Hanto Machang Stawn Tetsuzan Mangan-ko" [The manganese ore of the Machang Stawn iron mine, Malay Peninsula] and "Trengganu Kozan Jogyo Hokokusho (Hachigatsu-matsu Genzai)" [A situation report on the Trengganu mine (as of the end of August)] (all incorporated into Taisho Juyonen Nanyo Kogyo Koshi Kankei).
48. Oral communication. The following description is found on the "employees" of the Nanyo Kogyo Koshi a year after its inauguration. "It has 36 Japanese staff members, about 550 Chinese workers mainly engaged in mining, about 500 Malays mainly engaged in land conveyance, and about 200 Indians mainly in charge of barge transport." (The Japanese consul-general in Singapore, "Goshi Kaisha Nanyo Kogyo Koshi no Jigyo" cited above.)

49. The Ishihara businesses are listed in the footnote to Table 9, and the relationships among them are described elsewhere in this paper.
50. Oral communication. It is also pointed out in Sanjugonen-shi (draft) cited above that this method of personnel management, according to race and job classification, contributed to "peaceful accomplishment of the business without racial conflicts, as the work force was tactfully managed without racial discrimination by making full use of the characteristics and aptitude of each race." However, immediately after the war broke out between Japan and China, Chinese coolies staged a strike and walked out of the mine en masse, affecting the mining operation, although the company replaced them with Indian coolies (Ishihara Sangyo Kaiun Kaisha, Ltd., Daihakki Eigyo Hokokusho [Business report for the eighth term], 2nd half of 1937, was also referred to). From about that time on, labour problems in British Malaya were complicated by their nationalistic overtones (Shigeo Imamura, "Nampo no Tekko Shigen" [Iron-ore resources in the southern region], Japan Iron & Steel Federation, Chosa Geppo, No. 22, October 1940).
51. Oral communication.
52. Oral communication. In Ichimura, "Marai Hanto Tekko ni tsuite," June 1922, it is stated that the per-head daily wage paid to Chinese coolies at the Sri Medan iron mine in those days ranged from 1.30 to 1.50 Straits dollars, which was higher than not only the wages of Korean workers at Korean iron mines, but even those of tin mining coolies in the Kemaman area of Trengganu, who were daily paid from 0.80 to 1.30 Straits dollars per head. However, in Nanyo Kyokai, ed., Nanyo Kosan Shigen [Mineral resources in the South Sea Region], 1940, p. 247, and Otani, Marai no Keizai Shigen, 1943, cited above, p. 326, it is suggested, without citing any source of information, that this wage level had been prevailing at the times of their publication. Caution must be taken in referring to the descriptions of Malay iron mines in these two works (especially the latter), as they contain, not only in these parts but also elsewhere, mere copies from Ichimura's paper and Nampo Sho-chiiki no Tekko, both cited above.
- In addition, it is stated in Toyo Homen Shuyo Tekko Shirabe, cited above (p. 175), that "although the wages had previously been about one dollar (equivalent to about ¥1.20), 2 to 1.80 dollars were paid from 1926 on, under the impact of soaring rubber prices since 1925."
53. Oral communication. Circumstances changed after the outbreak of the Japan-China war, though. See Note 50.
54. Although it is stated in Ichimura's "Mirai Hanto Tekko ni tsuite," cited above, that the relatively high per-head wages caused an increase in mining costs, the mining and transportation costs per ton seem to have fallen, as described in the text.
55. Although prices of the ships and other pertinent factors are not known in detail, the general price level for ships was very low in those days. The construction fee had been ¥1,000 per ton during

the First World War; the per-ton price of 7,000 to 8,000-ton class ships of around 10 years of age is said to have dropped to something like ¥70 (Sogyo Nijunen-shi cited above, p. 20). As the three 7,000-ton class ships were purchased for ¥1,040,000, the average per-ton price actually was about ¥50.

56. The Nanyo Kogyo Koshi "Taisho Juyonen-do Jigyo Yotei narabini Keijohi Yosanhyo Setsumeisho" [An explanatory document for the programme of business activities and budgetary table of ordinary expenditure for fiscal 1925] (incorporated into Taisho Juyonen Nanyo Kogyo Koshi Kankei cited above). According to this document, the freight rate would be set at ¥5.35 per ton and, while the Nanyo Kogyo Koshi would take a quarter of any profit that might accrue, Machida Shokai would bear the whole loss, if any occurred. Incidentally, some trouble with the Ministry of Finance seems to have arisen because the ships which were purchased with a loan from the ministry's Deposit Division, for the purpose of "self-transport of ore," were operated jointly with another company, and the contract with the partner did not provide for the use of the ships exclusively for ore transport.
57. Oral communication and Sanjugonen-shi (draft) cited above.
58. According to the Nanyo Kogyo Koshi, "Showa Sannen-do Jigyo Yotei narabini Shushi Yosansho" [The programme of business activities and budget of revenue and expenditure for fiscal 1928] (incorporated into Taisho Jugonen yori Showa Yonen ni itaru Nanyo Kogyo Koshi Kankei Shorui cited above), the planned coal volume to be transported in fiscal 1928 was 15,000 tons (at a rate of ¥3.00 per ton) between Miike and Singapore, and 60,000 tons (at ¥3.20 per ton) between Dairen and Manila. It is stated in an appendix to "Showa Ninen-do Jigyo Yotei narabini Shushi Yosansho" [The programme of business activities and budget of revenue and expenditure for fiscal 1927] (incorporated into the same collection of documents) that, although direct service was the rule, "some circumstances in scheduling may sometimes invite doubling of ships at the loading port; adjust the sailing schedule in such a case, or, if it is profitable to do so, coal shall be carried on the outbound trip." The costs of direct service and a coal-carrying trip are compared therein.
59. Sogyo Sanjugonen o Kaiko shite cited above, pp. 74-75. According to Ishihara Jigyo Gaiyo cited above, in 1930 only three ships of 21,965 tons were registered as owned by Ishihara Sangyo Kaiun and 10 others of 81,668 tons nominally belonged to Ishihara Gomei Kaisha, so that the Ishihara group possessed a fleet of 13 ships totalling 103,363 tons. Although changes in the Ishihara-owned fleet are traced in an appended table to Sogyo Nijunen-shi cited above, the tonnages given therein are much too small (for instance, 13 ships of 65,575 tons in 1930 and 15 of 77,026 tons in 1932) and accordingly are rejected for the purpose of my work.
60. The Southern Godown Company, Limited, was a joint venture of Japanese and overseas Chinese interests, established in 1919 in Taipei at the

initiative of the Governor of Taiwan and the President of the Bank of Taiwan. It operated warehouses in such major cities as Canton, Saigon, Singapore, and Batavia; and at the same time provided local financial services through its affiliate, Kanan Ginko [the Bank of South China], but it fell into a slump in the late Taisho years. Hiroichiro Ishihara, complying with a request to rehabilitate this company in the form of transferring its liabilities to the Bank of Taiwan, participated in its management as supreme adviser from 1930 on. Sogyo Nijunen-shi cited above, pp. 25-27.

61. Eventually, in June 1935, the Java freight conference was dissolved, and its four Japanese members founded Nanyo Kaiun Kabushiki Kaisha (South Sea Shipping Co., Ltd.), which took over all their navigation and operating rights on the Java route. Ishihara; however, demanded immediate invocation of the Commerce Protection Law, in vain, and, parting with other Japanese shipping lines, in April 1936 established Nanyo Koro Kabushiki Kaisha (South Sea Marine Transport Service Co., Ltd.), predecessor of Nihon Kaiun Kabushiki Kaisha (Japan Shipping Co., Ltd.). This note is based on the above cited Sogyo Nijunen-shi, pp. 25-31 and 83-96, Sogyo Sanjugonen o Kaiko shite, pp. 70-86, and Sanjugonen-shi (draft).
62. The increase in production cost in the budget of 1925 was due to the ¥0.4 depreciation expense, earmarked from that year on. Subtracting this item would make the production cost smaller than the contracted price. Comparing the production cost of ¥11.10 in 1925 and 1926 with the then prevailing market price of ¥11.30, Hiroichiro Ishihara himself claimed there would be a "profit" of ¥0.20 (Ishihara, "Waga Seitetsu Genryo Tekko Kyokyu no Shorai wa Yuryo no Yo Nashi" cited above). While it is no wonder that the expenses of the Batu Pahat mining office in 1925 and 1926 (¥10.25 and 10.29, respectively) were below the contracted unit price, it has to be noted that the sum of these expenses and the business expenses of the head office and Singapore branch still was smaller than the contracted price.
63. Although the export duty per ton decreased from 70 cents in 1922 to 42 and 43 cents in 1928 and 1929, respectively, its proportion to the "subtotal" still was relatively large, nearly 20 per cent. In 1929 or 1930, the annual sum of tax paid by the Sri Medan was about 400,000 Straits dollars, accounting for 10 per cent of the 4,000,000 Straits dollar revenue of the Johore state. (The tax paid by the Kemaman mine constituted some seven per cent of the Trengganu state revenue; both according to Ishihara Jigyo Gaiyo cited above.) It is understandable that the state governments positively supported Ishihara's venture.
64. The "quantity actually shipped out of the mine" markedly increased from 358,831 tons in the first half of fiscal 1928, to 480,022 tons in the second half of fiscal 1929 (Kozan-bu Gyomu Son'eki-hyo [The annual operating profit-and-loss statement of the mining division]). Also refer to the trend of the quantities delivered to the steel works, shown in Table 8 above.

65. To add, it is stated in Part I (p. 89) of Nampo Sho-chiiki no Tekko cited above, after quoting figures shown in "Reference 2" of Table 13: "The proportion of the mining cost to the overall cost is very small, at most around 10 per cent. The combined proportion of depreciation and business expenses is only slightly greater than that of the mining cost, and these three items together account for about a quarter of the total cost. Since iron mining in the South Sea region uses the simple and easy open pit method, the production cost of iron ore in the South Sea region involves much smaller equipment and material costs than in the case of driving drifts, and this circumstance, coupled with the low labour cost, makes mining in this region very inexpensive." Whereas it is further pointed out that "the transport cost" from the mine to the loading port "may sometimes amount to 30 per cent of the total cost. The cost of short-range rail or barge transport is well known to be enormously greater in relative terms than that of long-range marine transport." Sri Medan ore required no rail transport but was conveyed from the mine to the ocean carrier in a "line-flow" system, resulting in the low proportion of its transport cost (13 per cent of the total cost in the second half of 1929, and even lower in 1935).
66. It is stated in Sogyo Sanjugonen o Kaiko shite cited above (pp. 166-167) that in 1924, in contrast to the per-ton price ex Yawata of ¥11.5, the freightage and "field expenses" were respectively only ¥4.5 and ¥4, resulting in a "profit" of ¥3. By 1929 the "profit" further increased as the freightage was less than ¥4 and the "field expenses" were ¥3, but these figures are too rough; especially the "profit" in 1924 is too great. (As I based my statement in "Kan'ei Yawata Seitetsusho ni yoru Tekkoseki no 'Antei-teki' Kakuho-saku," cited above, on this information, I take this opportunity to correct it.)
67. Sogyo Sanjugonen o Kaiko shite cited above (p. 165), too, referring to the tight financial position of the company in that period, states: "Stop-gap financial steps were taken, including the discounting of iron ore bills of lading to make up for the fund shortage, paying freightages by promissory notes and indefinitely putting off the settlement dates of the notes."
68. "Koseki-dai Tsumitatekin Nanaman-sanzen Yen Kaiho oyobi Taiwan Ginko Shinki Nijuman Yen Kashidashi ni Kansuru Ken" [Re release of the ¥73,000 reserve of ore sales proceeds and a new ¥200,000 loan from the Bank of Taiwan], 20 July 1925 (incorporated into Taisho Juyonen Nanyo Kogyo Koshi Kankei cited above). Whereas the Nanyo Kogyo Koshi requested release (granting to the Nanyo Kogyo Koshi) of the excess savings reserved in the Bank of Taiwan, together with a new loan, it has to be noted that this request was justified by the steady progress of iron ore mining and delivery.
69. "Jigyo Yotei narabini Shushi Yosansho" or "Jigyo Yotei narabini Keijohi Yosansho" for every fiscal year from 1925 till 1928 (incorporated into Taisho Juyonen Nanyo Kogyo Koshi Kankei or Taisho Jugonen yori Showa Yonen ni itaru Nanyo Kogyo Koshi Kankei Shorui, both cited

above). Incidentally, "Showa Yonen-do Jigyo Yoteisho" [The programme of business activities for fiscal 1929] is a brief document giving no detailed figures on the expected revenue and expenditure.

70. "Seifu Kariirekin Hokoku no Ken" [Re a report on the loan from the government] addressed by Hiroichiro Ishihara to Director-General Nakai of the steel works, dated June 15, 1927 and August 1, 1928. Also documents addressed by the Nanyo Kogyo Koshi to the steel works, dated May 4, June 18 and December 20, 1929 (all incorporated into Taisho Jugonen yori Showa Yonen ni itaru Nanyo Kogyo Koshi Kankei Shorui cited above).

In April 1927 the Nanyo Kogyo Koshi voluntarily proposed to the Bank of Taiwan that it would increase at any time, if the steel works anticipated a default in repayment, the reserve for loan repayment (deposited with the Bank of Taiwan at a rate of ¥1.30 per ton of iron ore or ¥2.50 per ton of manganese ore.) (A document dated April 20, 1927, addressed by the Nanyo Kogyo Koshi to the Bank of Taiwan; incorporated into Taisho Jugonen yori Showa Yonen ni itaru Nanyo Kogyo Koshi Kankei Shorui cited above.) This proposal was made when the Bank of Taiwan was suspending its business activities because of a financial panic. It reveals the self-confidence of the mining company (unlike Hanyehp'ing and Yüfan).

71. Sogyo Nijunen-shi cited above, p. 131.

72. In Sogyo Sanjugonen o Kaiko shite cited above, p. 167, the full repayment of the Deposit Division loan is stated to have been achieved in 1931, eight years in advance of the contracted deadline, and my "Kan'ei Yawata Seitetsusho ni yoru Tekkoseki no 'Antei-teki' Kakuho-saku" cited above followed this information, but, as I later pointed out in the above cited supplement to my paper (Table 10), the outstanding balance of Ishihara Sangyo Kaiun's debt to the Deposit Division remained to be listed until the end of fiscal 1932, and was recorded to be zero for the first time at the end of fiscal 1933 (March 31, 1934). Taiwan Ginko-shi cited above, p. 421, also alleges the full refundment of the Deposits Division loan to have been made on March 20, 1934. However, the balance of the governmental loan after the settlement of accounts in March 1934 is stated to be ¥900,000 (against a bank deposit of ¥2,000,000) in Sogyo Nijunen-shi cited above, p. 132, and in Table 14 ¥1,300,000 is listed as debt at the end of the second half of 1933. If the full balance of the Deposit Division loan was repaid at the end of fiscal 1933 (31 March 1934), the company must have again borrowed a sum in excess of its repayment.

73. See Ishihara Jigyo Gaiyo cited above. When the Nanyo Kogyo Koshi purchased ships in 1924, Ishihara Goshi Kaisha (Ishihara & Co., a limited partnership; capitalized at ¥100,000) was established in Dairen for the convenience of their registration (Sogyo Sanjugonen o Kaiko shite cited above, p. 165), and all those three ships were registered in the name of Ishihara Sangyo Kaiun Goshi Kaisha in 1930.

74. Ishihara Jigyo Gaiyo cited above. Also see Sogyo Sanjugonen o Kaiko shite, p. 165. However, although this book alleges the capital of Ishihara Sangyo Koshi in Singapore at the time of its founding (presumably about the time the Deposit Division fund was borrowed in 1924 though not expressly stated so) to be 3,000,000 Straits dollars, this sum is obviously too large.
75. Ishihara's businesses in 1930 also included Nangoku Mokuzai Kabushiki Kaisha (Southern Lumber Co., Ltd.; headquartered in Osaka and capitalized at ¥100,000), engaged in "import and sale of South Sea lumber" (Ishihara Jigyo Gaiyo cited above).
76. See Ishihara Jigyo Gaiyo cited above.
77. Although the relationship between Ishihara Sangyo Kaiun Goshi Kaisha and Ishihara Sangyo Koshi (Singapore) is explained as the former being commissioned by the latter to take charge of the transport and sale of ore for a remuneration of ¥0.50 per ton of ore, figures in this chart do not suggest such a relationship. Further, statements in this book and Ishihara Jigyo Gaiyo cited above seem to imply that the relationship between the two remained the same since the establishment of Ishihara Sangyo Koshi (Singapore). However, accounting procedures at least presumably differed before and after the latter's reorganization into a joint stock company (in September 1930). "Operating profit-and-loss statements" like the ones put together in Table 17 are available for 1928 and 1929; and the mining cost and other items are counted on the part of Ishihara Sangyo Kaiun until the first half of 1930, as indicated in a footnote to Table 18 (b). In Kessan Hokokusho [The account settlement report] (submitted to the civil administration authorities of Malaya) for the 18th term (the first half of 1929), "ore purchase prices" are referred to. Perhaps two different financial reports were prepared, not just for that term but also for others. If so, the consistency between the profits in Tables 18 and 14 until the 20th term (the first half of 1930) and the discrepancies between them thereafter are understandable. One may also wonder why reserves are recorded in Tables 16 and 18 from early years but not until the first half of 1931 in Table 14, but here I would only draw attention to the statement in Sogyo Sanjugonen o Kaiko shite cited above, p. 166, that "off-the-book reserves of ¥0.50 per ton" were set aside.
78. Ishihara Sangyo Kaiun Goshi Kaisha, Taiwan Ginko (Okura-sho) Teishutsu Kessan Hokokusho [Account settlement reports submitted to the Bank of Taiwan (Ministry of Finance)] (from September 1930 through September 1933).
79. The only remaining document concerning Ishihara Gomei Kaisha is Ishihara Sangyo Goshi Kaisha (before its reorganization), Daiikkai Kessan Hokokusho [The first account settlement report] (from June 1, 1929, the date of founding, through March 31, 1930). According to this document, Ishihara Gomei Kaisha then owned four ships, purchased for ¥166,000, constituting a predominant part of its ¥168,000 assets, earned ¥119,000, out of its total revenue of ¥120,000, by chartering

out its ships and chalked up a profit of ¥65,000, interest payments of ¥51,000 and other minor expenses being subtracted from its gross income.

80. Sogyo Nijunen-shi cited above, pp. 132-134 and an appended table. Accounting data in that period are systematically compiled in Sanjugo-nen-shi (draft) cited above, and those from 1937 on are also found in Eigyō Hokokusho [Business reports]. However, as the company diversified its business activities, data found in these pieces of literature can hardly serve as a basis for analysis of its iron mining operations in British Malaya, though Singapore Kaikei Hokokusho [Accounting reports from Singapore] and Singapore Sokatsu Hokokusho [General reports from Singapore] (for every term from 1934 through 1940) are available as reference materials on the accounting of Ishihara Sangyo Koshi in Singapore. For a comprehensive study, they also have to be analysed, but regrettably I am obliged to disregard them for this particular work as they are vast collections of numerical data alone but contain little information on the iron mine operations in that period and further because my paper has already much exceeded its prescribed length.
81. In this context it is interesting that Hiroichiro Ishihara himself allegedly became critical about the Japanese military's way of "developing the Southern region" (Hajime Shimizu, "Ishihara Hiroichiro ni okeru 'Nanshin' no Ronri to Shinri" cited above).
82. Yawata Seitetsusho Gojunen-shi cited above, pp. 92-94. As other reasons are mentioned the facts that steel made by the converter process was inferior to open-hearth steel in smelting yield and product quality and that the pig iron was more costly than scrap iron.
83. Yoshio Horikiri, "Nihon Tekko-gyo ni okeru Sen-Ko Seisan no Hensokuteki Seisan Kozo no Keisei to Sono Gijutsu-teki Yoin" [The formation of the abnormal structure of pig iron and steel production in the Japanese iron and steel industry, and underlying technical factors], Shakai Keizai Shigaku, Vol. 42, No. 2, 1976, p. 62. Also see Horikiri, "Taisho-ki no Tekko Seisan Kozo ni okeru Sentetsu Seisan Bumon no Sonzai Keitai" [The form of existence of the pig-iron-producing sector in the iron and steel production structure in the Taisho period] (an article contributed to Tochi Seido Shigaku, issue no. 86).
84. The following statement concerning the quality of Sri Medan iron ore deserves note: "In spite of its somewhat high phosphorus content, though its sulphur content is low, it is an ideal ore as blast furnace raw material for low-silicic acid pig iron production and for charging into open-hearth furnaces because of its low silicic acid content." (Nampo Sho-chiiki no Tekko cited above, Part 2, p. 7.) A similar evaluation is stated of Dungun ore (*ibid.*, p. 15).