Geopolitics, Information, and Logistics

A Narrative on Trading Companies in Imperial Japan*

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Abstract

One profit source for trading companies is matching demands with supplies in highly differentiated markets. It is theoretically known that in-person networks based on imperial legacies, immigrants, and general trading companies that share a common language and culture help trades of differentiated goods expand. However, little is known about how such networks help make deals for differentiated goods. To investigate the role of general trading companies, we study how major trading companies navigated a sensitive transaction in imperial Japan in the first age of globalization: the procurement of shale oil retort facilities in Manchuria. Our archival research with confidential documents reveals that trading companies logistically supported Japanese buyer's engineers in meeting Western suppliers' engineers in person and visiting plants in the West to acquire tacit knowledge beyond written specifications. We interpret that such logistical support as a substitute for imperial or immigrant networks.

Keywords Information exchanges; trading company; oil shale retort; first globalization.

JEL classification codes N85; N75; M31; M21.

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1 Introduction

There are two sources of profits in the financial industry. One is the arbitrage of differences in valuations of already issued debt instruments. The field comprises competitive markets that are open to potentially infinite market participants. The faster the processing of revealed information is, the higher the return. The other source is the evaluation of potential investment projects or debt instruments, including corporate financing for future projects, the underwriting of common stocks and bonds, and advice for mergers and acquisitions. Matching the private information of potential debtors or bought-out companies and information about risk premium demanded by potential investors yields profit. Such markets are, by definition, monopolistic or oligopolistic (Fama and Laffer, 1971, Gonedes, 1975, Campbell and Kracaw, 1980, Fried, 1984, Baskin, 1988, Chemmanur, 1993, Corwin and Schultz, 2005, Qian et al., 2015).

Trading companies are the counterparts of financial institutions in the real economy. One essential operation of such companies is the arbitrage of distortion in commodity markets (Koerner, 1998). The other is making deals in markets of differentiated goods by matching potential buyers with potential sellers. This is the critical role of a network based on an imperial legacy, an immigrants' network, or general trading companies in Japan and Korea. Roehl (1983) theoretically argued that general trading companies' relational contracts with clients reduced transaction costs. Furthermore, Rauch (1996a,b, 1999, 2001), Rauch and Watson (2004) theoretically argued for the role of matching buyers and sellers of networks based on imperial legacy, ethnicity, and general trading companies in the international trade of differentiated goods, and Rauch and Trindade (2002) empirically presented that the density of Chinese offshoots in a country is associated with the growth in trade with China. Eichengreen and Irwin (1998) presented a consistent result for imperial legacies. In summary, Rauch (1996a,b, 1999, 2001), Rauch

and Watson (2004) conjectured that the global networks of Japanese and Korean general trading companies, *sogo shosha* in Japanese, are a substitute for imperial and ethnic networks that share a language and culture.

This view is consistent with the discussion of business history. An essential role of trading companies is considered to be a reduction in the transaction costs incurred by sellers and buyers (Jones, 1996, 105). Notably, the period from the late nineteenth century to the early twentieth century was the first age of globalization (Mauro et al., 2006, 1–45). Throughout the globalization process, "business trip"s for in-person meetings and building "face-to-face" relationships were crucial for information exchanges (Miller, 2003). Trading companies were a driving force in building such global networks (Boon and Storli, 2023). Particularly for Japan, whose empire was geographically limited and whose population was much smaller than that of China, global networks based on an empire and dense network of immigrants were not available. General trading companies were the only available choice to facilitate global trades of differentiated goods.

However, the theoretical conjecture by Rauch (1996a,b, 1999, 2001), Rauch and Watson (2004) raises a question: what have general trading companies been doing since their birth in Japan in the late nineteenth century? Although modeling by Rauch (1996a,b, 1999, 2001), Rauch and Watson (2004) heavily depends on assumptions of historical path dependency for Western empires, Chinese migrants, or Japanese general trading companies, empirical or descriptive evidence of what they are doing has not been presented. If an imperial or migration legacy that shares just a language and culture can be a substitute, then a company's core competence is not its technical expertise about the differentiated goods they deal with because it cannot be handled just by British, French, or Chinese offshoots with various current backgrounds. Thus, what have general trading companies been doing?

To investigate this question, we need to study specific cases trading companies have handled, taking as an example the activities of the largest Japanese general trading companies, Mitsui & Company (Mitsui Bussan) and Mitsubishi Corporation (Mitsubishi Shoji) (Morikawa, 1970, Wilkins, 1986, 1990, Yonekawa, 1990, Abe, 1997, Mizuno and Prodöhl, 2019). In Japan, leading trading companies such as the Mitsui & Company and Mitsubishi Corporation linked information on machinery and arsenals from the supply side in the West with domestic clients such as manufacturers and the government. They were also been engaged in commodity trades, notably raw materials from Asia and Australia. Their activities were crucial to Japan's industrialization and modernization of its military capability.

Among their activities, we focus on the energy industry. Just as Western Europe depends on Russian gas, imperial Japan was dependent on US oil, which was essential to its navy, while building aircraft carrier groups whose imaginary enemies were the US and the UK. Additionally, just as China has depended on advanced technologies from the US, imperial Japan depended on Western technologies to modernize its military capabilities. Imperial Japan also faced the issues of diversifying its energy sources and developing its own technology. Thus, the Japanese case of the interwar period has geopolitical relevance today.

One of the solutions in imperial Japan was the development of the oil shale industry in Manchuria. As described below, after trials, the South Manchuria Railway developed an internal heating retort system, which had just been adopted by Estonia and research on which had just begun in the US. Japanese trading companies connected potential sellers of elemental technologies in the West with the buyer, the South Manchuria Railway, to facilitate the buyer's engineers meeting the potential sellers' engineers and make in-person visits to plants where advanced facilities were operated to acquire tacit knowledge.

This paper studies the behaviors of the largest trading companies, Mitsui & Company and the Mitsubishi Corporation, by examining sensitive transactions in imperial Japan; the procurement of oil shale retort facilities for the Fushun Coal Mine of the South Manchuria Railway in the 1920s. By so doing, we can determine what trading companies were truly doing in highly differentiated and profitable markets. For this purpose, we adopt the method of archival research, relying on confidential documents issued by and to US branches of Mitsui and Mitsubishi that were confiscated as assets of a hostile state by the US during the Pacific War. The rest of the paper is organized as follows. Section 2 describes the geopolitical context of the oil shale industry of Manchuria and the transitional state of the shale industry. The 1920s was a turning point for the shale oil industry when the Scottish external heating system for retort was being replaced by internal heating systems. Section 3 specifies our focus and presents our methodology. Section 4 describes how Mitsui and Mitsubishi approached engineers from the South Manchuria Railway, who debated whether to adopt the reliable but costly Scottish external heating technology or develop an internal heating system. Section 5 discusses the roles of trading companies to conclude the paper.

2 Geopolitical context and oil shale industry

2.1 Geopolitical context

In the early twentieth century, Manchuria was a crucial geopolitical area for the Republic of China, the US, the USSR, and the Empire of Japan. It was also a center of growth in northern China (Gottschang, 1987). Russia had built and operated the Chinese Eastern Railway in Manchuria since 1897. As a result of the Russo-Japanese War in 1904-1905, Japan acquired the southern Manchurian part of the Chinese Eastern Railway and

reorganized it under the South Manchuria Railway. The USSR inherited the remaining part of the Chinese Eastern Railway in 1917. Seeing Soviet Russia as a common threat, Zhang Zuolin (Chang Tsuo-lin), the warlord of Manchuria, and the Empire of Japan cooperated until the imperial army of Japan assassinated Zhang in 1928 (Matsukata, 2001, 258–266, 293–348).

The South Manchuria Railway became an experimental lab in which Japan could test advanced technologies. For instance, the fastest train under Japanese control before 1945 was the limited express called the "Asia", which operated on the Southern Manchuria Railway (Oyama et al., 2019).[1]

2.2 Oil shale industry in transition

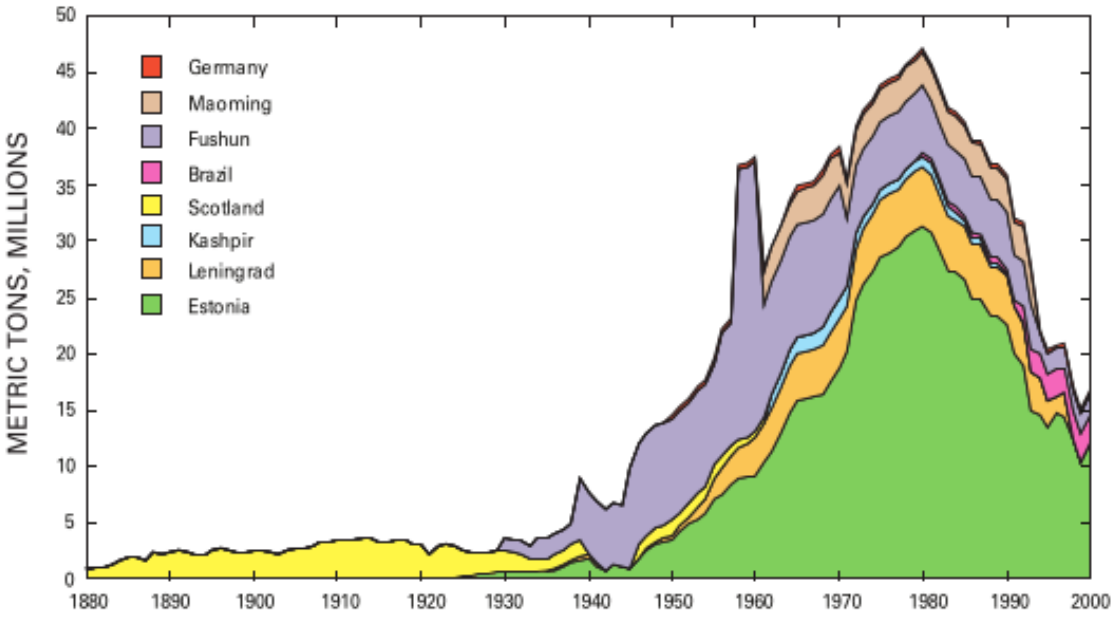
In the mid-nineteenth century, the Scottish shale oil industry was leading the global oil industry. However, from the late nineteenth century on, oil production from oil wells in the US and the Middle East increased and achieved price competitiveness. Therefore, even as imperial Japan was planning to develop the oil shale industry in Manchuria in the 1920s, the oil industry was in a transitional phase. While British, specifically Scottish, technology had been stably operating and had become well established, its competitiveness in the global market began to decline (Gavin, 1924, 91–96), (Okamura, 1926, 277), (Butt, 1965, Harvie, 2010, Gallois, 2012, Dean, 2018, Craig and Underhill, 2019). These issues were exacerbated by another emerging source of shale oil, Estonia, as shown in Figure 1.

The provincial government of Estonia first sent experts to Scotland in 1919 to consider the adoption of Scottish retorting technology. The experts who visited the Scottish

[1]The steam locomotive that pulled the express, the Pasina model (renamed the model SL 7 by the People's Republic of China after the war), is displayed in the Shenyang Railway Museum (http://www.China.org.cn/english/olympic/218670.htm: Accessed on March 6, 2023).

shale oil plant found that Scottish technology would not work for Estonian shale because it was chemically different from Scottish shale. Therefore, in 1921, the Estonian government decided to build its own technology based on German internal heating technology that had been developed for coal retort, and the plant was completed in 1924. After that point, Estonian shale oil output surged (Tammiksaar, 2014).

Figure 1: Output of oil shale from Estonia, Russia, UK, Brazil, China and Germany, 1880–2000.



Source (Dyni, 2006, 38).
Notes: Estonia: Estonia deposit; Russia; Leningrad and Kashpir deposits; UK: Scotland and Lothians; Brazil: Iratí Formation; China: Fushun and Maoming deposits; Germany: Dotternhausen. The Fushun output was that of the Fushun Coal Mine owned by the South Manchuria Railway until 1945.

One difference between the Scottish technology for oil shale retorting, represented by the Pumpherston type, and other growing technologies was whether internal or external

heating was used for retorting. The Scottish-type retorting plant had distilling pipes inside the chimney, so the fire surrounded the distilling pipe covered by a wall. This basic structure was established in the late nineteenth century and was used throughout the 1920s (Beilby, 1897, Henderson, 1897, Brownlie, 1929). Meanwhile, internal heating for retorting from coal to oil has been quickly developing in Germany since the early twentieth century (Fischer, 1924, 76–80)(Fischer, 1925, 88–94). The application of internal heating designed for coal retorting to the retorting of kerogen shale was a straightforward approach.

In the US, an experiment to compare internal heating with external heating was implemented by the Bureau of Mines from 1926 to 1929. A standard Pumpherston commercial type was adopted as an external heating retort process, and the Nevada-Texas-Utah process of the N-T-U Company, based in California, was adopted as an internal heating process (Gavin, 1928). Based on the results, the Bureau of Mines implemented an experiment on the N-T-U process in a larger plant from 1946 to 1951 (Lankford and Ellis, 1951, Hull et al., 1951). The N-T-U process employed internal direct heating by internal combustion. The Union Oil Company in California also implemented an internal heating process in 1943 (Russell, 1980, 107). Both the N-T-U and Union Oil processes were considered to have the advantage of "better heat economy" (Hull et al., 1951, 9). However, after 60 years of experimental study, the US oil shale industry had not achieved true commercialization (Russell, 1980, 102). As the traditional Scottish retort process continuously lost its competitive edge to natural petroleum, only the oil shale industries in Estonia and Manchuria still had commercially produced natural petroleum (Russell, 1980, 3) before the so-called "shale oil revolution" due to horizontal drilling and hydraulic fracturing in the US in the 2000s (Hughes, 2013).

2.3 Our case: Shale oil project in Manchuria

Among the most geopolitically and technologically urgent issues for the Empire of Japan in the 1920s was the diversification of fuel sources. The imperial navy almost solely depended on oil imported from the US, while the relations between the US and Japan were strained. One possibility for the navy was shale oil in the Fushun Coal Mine owned by the South Manchuria Railway. Kerogen shale was found in Manchuria in 1909, and then the South Manchuria Railway began studies on the kerogen shale industry (Okamura, 1926, 1930).

While both the navy and the South Manchuria Railway aimed to produce oil by retorting kerogen shale from Fushun, the two groups' priorities did not necessarily match. On the one hand, the navy aimed to diversify oil sources and prioritized the reliability of oil production. On the other hand, even if it was partially state owned, the South Manchuria Railway had to earn a profit. Its priority was therefore cost performance.

Experts from the South Manchuria Railway, the navy, and the army formed a council for procurement that met 21–28 May 1925. Within the South Manchuria Railway, Tadao Kimura, a researcher at the Central Laboratory of the South Manchuria Railway, studied retorting methods for two years prior to 1924 and advocated for the Scottish method (Okamura, 1926, 278).

The council first decided to adopt the Scottish technology that Kimura recommended with strong support from the navy. The navy pushed for early realization by adopting the well-established Scottish technology. However, the navy also demanded cost reduction (Yamamoto, 2003, Iizuka, 2003).

Estonia began to operate a plant with an internal heating system, which proved to be successful in 1924. Inspired by this, the South Manchuria Railway began experiments with the internal heating method in 1925 and concluded that internal heating based

on the German Mondgas method would work better, particularly given that Fushun kerogen included less oil than Scottish kerogen. Kinzo Okamura, Department Chief of the Fushun Coal Mining Industry of the South Manchuria Railway, led the development of the internal heating system. In 1926, the internal heating method was established, the results of experiments were published in an expert journal in 1926, and the South Manchuria Railway decided to build an original retort plant based on German technology in 1926 (Okamura, 1926, Oshima and Uchida, 1926).

The South Manchuria Railway began to construct retorts in 1928. The construction was finished and retorts began operating in 1929 (Okamura, 1926), (Journal of the Society of Chemical Industry, 1929, 1180), (Okamura, 1930). Kerogen shale in different regions, such as between Scotland, Fushun, and California, has different chemical compositions (Eguchi, 1927, 1928a,b, Jones, 1950). Thus, chemical studies and engineering sophistication should be integrated into the construction of kerogen retort plants.

3 Method and materials

We focus on the critical year of 1924, when promising technology was not yet proven, as the well-established Scottish shale industry was losing its competitive edge and the Estonian plant began its operations. Specifically, we examine how the largest trading companies, Mitsui & Company and the Mitsubishi Corporation, approached two essential engineers from the South Manchuria Railway, Tadao Kimura and Kinzo Okamura.

To arrange visits to plants to see how they worked and then to procure plants or patents, the South Manchuria Railway needed assistance from trading companies. For the trading companies, the profit was only earned at the last stage, procurement. To obtain an order for procurement, trading companies competed for requests to visit oil shale laboratories and plants in the US, Europe, and Scotland. Securing informative

visits to plants would make experts from the South Manchuria Railway seriously consider procurement of the technology, and they would pay a fee, including the cost for matching between plant manufacturers and the South Manchuria Railway.

Therefore, the primary role expected of trading companies was offering practically valuable matching between potential sellers and the South Manchuria Railway. To this end, trading companies needed information about people familiar with technologies related to the oil shale industry and plant operation globally. The information was expected to help better match experts from the South Manchuria Railway with potential sellers.

To study what trading companies were truly doing, we need primary source documents that record trading companies' communication with Kimura and Okamura. Usually, such documents are classified as very confidential and are thus inaccessible to researchers. However, after Japan attacked the US in 1941, any assets, including the confidential documents of trading companies with branches in the US, were labeled assets of the enemy and condemned. After the Pacific War, the documents were transferred to the US National Archives and Records Administration, hereafter NARA, and made public. We rely heavily on the documents on the meetings of Mitsui and Mitsubishi with engineers such as Kimura and Okamura from the South Manchuria Railway. By doing so, we can study what trading companies were doing, which would have been impossible if the Pacific War had not happened. We also partially rely on documents held by Mitsui Bunko, the archive of the Mitsui group. Therefore, our methodology is archival research that qualitatively describes the behaviors of trading companies.

4 Roles of trading companies

4.1 Handling business meeting costs within trading companies

While Mitsui & Company considered the time spent gaining internal expertise regarding potential clients to be critical, the imputation of such social spending costs became an issue. Social spending, including allocating specialized staff, searching for potential sellers and providing logistical support for clients to visit potential sellers and their operation sites, was highly likely to provide the company as a whole with a higher margin per transaction than operations in competitive commodity markets. However, for financially independent branches, their own social spending to advise potential clients of another branch implies a positive externality. Without addressing the issue, social spending for the information exchanges of the trading company as a whole inevitably becomes less than the optimal level.

The following is a statement from the director of the Hong Kong branch during a 1921 conference on this matter involving representatives from the global branches of Mitsui & Company as part of a project to address this issue.[2]

> At the Hong Kong branch, whenever a ship arrives, the number of visitors from the east, west, south, and, in particular, north [Japan] bringing references issued by a board member of the headquarters is numerous. In fact, to accommodate them, one or two specialized staff need to be in charge of handling their visit. If we do not care for them, the reputation of our company will be hurt, so we are dedicated to treating them kindly. However, we have insufficient capacity,... and 99% are spent for visitors with references issued by other branches,... we expect that if the social spending costs inevitably

[2] "Mitsui Bussan shitencho kaigi gijiroku (Minutes of Branch Managers' Conference)," 1921, pp. 588–589, Mitsui Bunko.

> rise further, social spending should be imputed to the branch that originated the request for a meeting with the visitor.

In short, the Hong Kong branch requested the imputation of social spending to branches from which visitors to the Hong Kong branch originated. Otherwise, it implicitly warned that the Hong Kong branch would provide less than optimal support to visitors in terms of the maximization of Mitsui's profit as a whole through its "reputation".

For the global operations of Mitsui & Company, while the Hong Kong branch was a gateway to the East, the San Francisco branch was the gateway to the West after the First World War. The burden incurred by the San Francisco branch rose accordingly. The following is an excerpt from a letter sent by the San Francisco branch manager to the headquarters in 1924.[3]

> Whatever the reference indicates, we end up having to take care of visitors, and it costs us.
>
> 1. ...
> 2. Moreover, their questions are so eccentric, such as how thick the asphalt of road surfaces is in San Francisco, wanting to see facilities of some pier of the port, on railways, and so on. Visitors are either from the public or private sector, and their specialties are broad, so that we do not necessarily know from A to Z, and we quite often have to study them. Such questions include those that would have been better asked in New York or London, but they want to convey some stock of knowledge to us when they land here, and we have to answer that we don't know about

[3] "Ryokosha ni taisuru shokaijo hakko kata no ken (On issuance of letters of introduction of visitors), 7 May 1924, in "Kaigiroku (Minutes of round-robin decisions)" of Executive Managing Directors, Bussan 2372, Mitsui Bunko.

> what we don't know, but in reality, we have to keep their company and make some sort of suggestion.
>
> ...
>
> If our staff spend one hour, it costs approximately 2 dollars. If someone has to send a message by telegraph, it needs time for stenography, sightseeing costs such as for a taxi ride. If they are in our office, they interrupt our business by talking loudly so that we have had to prepare a reception office to quarantine them, which also costs more than simple business purposes.

Visitors to the San Francisco branch from Japan, often engineers, were experts in their field,. Although the letter complained about questions from such visitors, the questions were likely asked to test the knowledge of the trading company's staff. For example, the thickness of "the asphalt of road surfaces" is a crucial factor that determines the construction cost and durability of the road. Observation at facilities in person is critical to acquire tacit knowledge about the operations beyond what can be ascertained through academic journals. The complaint about the conveyance of visitors' knowledge indicates that visitors suspected and confirmed that the trading company's agents were not engineering experts. This was possibly because the trading companies' staff were mostly graduates with degrees in business, economics, or law, not engineering. This point is related to the roles of trading companies expected by client companies, as studied below in section 4.2. In either case, accommodating visitors was felt to be quite burdensome and costly for the staff of the San Francisco branch.

The issue was crucial, particularly because each branch was an accounting entity. In other words, what the manager of the San Francisco branch of Mitsui & Company truly wanted to discuss was imputed social spending. His point was that the cost of social

spending directly incurred by the San Francisco branch should be imputed to branches of origin when each branch's earnings were calculated.

In response to this request, in May 1924, Mitsui & Company introduced an imputation system of social spending under which the social spending cost incurred by a visitor's destination branch was imputed to the visitor's original branch that had issued a reference for the visitor. The system of notification for the branches also mentioned that visitors' origin branches should not misguide visitors into expecting extravagant business entertainment.[4] The aim of the social interactions was not to have tasty dinners but to exchange information.

4.2 Logistical support for the client

Key persons among the council members in deciding the procurement of shale oil retort facilities were Tadao Kimura, a researcher at the Central Laboratory of the South Manchuria Railway; Kinzo Okamura, the Department Chief of the Fushun Coal Mining Industry under the South Manchuria Railway; Keido Uehara, a researcher at the Fuel Fabrication Plant and engineer major with the Imperial Navy; and Kanji Kurihara, a Professor at Meiji Vocational College and engineer at the Tokuyama Coal Briquetting Plant of the Imperial Navy. This group sought technical information from across the globe in 1924 to prepare for the council meeting planned in 1925. In particular, Kinzo Okamura from the South Manchuria Railway and Kanji Kurihara from the navy played critical roles in procurement decisions (Okamura, 1926, Yamamoto, 2003).

In 1923, Tajiro Shirahama, the manager of the Equipment Division of the General Accounting Department, and Jo Ushijima, the manager of Railway Operation of the

[4]"Ryokosha ni taisuru shokaijo hakko narabini setsugu hiyo tsukekaekata (On issuance of letters of introduction of visitors and imputation of costs of attending visitors), 10 May 1924. RG131, Entry62, Box82, National Archives and Records Administration (hereafter NARA).

Department of Railway of the South Manchuria Railway, planned an official trip to London to study oil shale retort facilities in Britain. The director of the Dalian branch of the Mitsubishi Corporation sent a letter to the director of the London branch. The letter was titled "On the effects of attending clients on official trips" and requested that someone from the London branch greet Shirahama and Ushijima.[5]

> Therefore, we earn really noteworthy profits due to your branch and other branches that courteously treat clients who make official trips from this region [Manchuria], and because of that, we would like to note what we expect just in case and please kindly tell it to the director of your branch and managers of divisions in charge.
>
> 1. Although we would like to express our appreciation to our clients of the South Manchuria Railway and other authorities who favor us, we should be careful about gifts, and they often hesitate to be invited to dine, and even if we find it less conspicuous to invite them to dine, they don't appreciate it that much, such that it is just waste of money.
> 2. Specifically, we have almost no such opportunities for government officials.
> 3. ...
> 4. Absolutely, we do not wish other branches to spend large amounts to satisfy the material needs of visitors, and it would be sufficient to communicate with them seriously and courteously, as is our established habit.

[5]Letter from Seiichi Mishima, the Manager of Dalian Branch, to Takeo Kaji, the Manager of the London Branch, "Gaiyusha settai no koka ni kakaru ken (On effects of attending clients on official trips)," October 24, 1923. RG131, Entry42, Box375, NARA.

5. For travelers far from home, hospitality by fellow Japanese would be far more valued than money and would become a pleasant memory that is remembered for a long, long time, as demonstrated by the clients who come back to this branch and express cordial gratitude to overseas branches of our company.

6. In addition, whenever gentlemen from the South Manchuria Railway or other organizations are dispatched overseas, they are on a mission to study industrial machines and further on a mission to procure them and are accredited to do so, or these trips are a step toward future promotions.

7. Mitsui & Company, which is a little ahead of our company in human resource management, internal information exchanges, and advertising, dispatches internal engineers from this place [Dalian] or engineers who work abroad to attend the researchers of facilities that cost million or ten million yen, such as the grain elevator of the South Manchuria Railway and the Fushun washing plant, so that [Mitsui & Company] pays the cost to dispatch own engineers to the East from overseas operations, and by doing so, pursues ten-thousand-yen orders of consignment purchasing from the South Manchuria Railway and, in case of open bidding, attempts to become preferred by the market.

8. Although our company takes its own path and does not need to follow Mitsui & Company, we could gradually move forward and assume that an increase in our personnel will be accompanied by examining the names of official overseas travelers and that sufficient efforts should be made to transmit internal transmission of discovered information...

9. While we understand that you believe that engineers on overseas trips should be the most respected, so-called clerical staff should not be overlooked, since they will be promoted to department manager or division manager...

There are three critical points in this letter. The first is that potential clients from the South Manchuria Railway, the imperial army, and the imperial navy did not want to have extravagant dinners. This might be because they wanted to save time but also because of the stringent probes by investigators under the Constitution of the Empire of Japan. Under the Constitution of the Empire of Japan of 1889, both judges and prosecutors were perfectly independent from the legislature and administration, including the military (Mitani, 1980). Judges and prosecutors were defined as directly serving the emperor such that they were always internally promoted. Neither the cabinet nor the military were allowed to intervene in their promotions. Thus, law enforcement activities involving them, such as investigations of corruption, were much more stringent before 1945. The staff of the South Manchuria Railway and officers of the navy and army therefore feared that their procurement activities were suspected of corruption (1, 2, and 4).

The second critical point is that potential clients still wanted to interact with their fellow Japanese overseas (5). This is precisely what Rauch and Trindade (2002) presented. Rauch and Trindade (2002) found that just the density of the Chinese population in a country is associated with trades between that country and China. Just the existence of fellow Chinese there and meeting them facilitates the mother country's business persons' access to the host country. Its significance was recognized by Japanese trading companies. In that sense, branch offices of Mitsui and Mitsubishi abroad were substitutes for Chinese communities across the world. Potential clients did not need dinners but did need time from Japanese staff overseas.

The third and most important point is that potential clients desperately wanted to access information about new technologies in the West, and to meet the demand, the rival Mitsui & Company dispatched internal engineers to give advice and suggestions to engineers and officials from the South Manchuria Railway, the navy, and army, who were in charge of procurement and were likely to be promoted to managerial positions (6–9). Forming links between the potential demand and supply sides globally, that is, information exchanges, was the most critical task of trading companies in highly differentiated high-end markets.

In August 1924, Kinzo Okamura planned to visit, through the Dalian and Yokohama ports, the US, Britain, Germany, and Sweden to obtain knowledge about oil shale retorts. The Dalian branch of the Mitsubishi Corporation wanted to be involved in the project. Thus, the director the Dalian branch sent a letter to the headquarters of the Mitsubishi Corporation.[6]

> We asked Mr. Okamura to give us an opportunity to meet and have dinner, but he declined because he arrived at Dalian this morning, the home of the South Manchuria Railway, so we could not have such an opportunity... We would like you to meet him [before his departure to the US].

Concerned about becoming suspected of corruption, Okamura declined the dinner in Dalian. Having received the letter from the Dalian branch, Kyohei Kato, the Executive Managing Director, and Kono Yoshitoshi, the Vice Director of the Division of Machinery at the Headquarters of the Mitsubishi Corporation, met Okamura on 16 August 1924 and heard about the aim of the trip and his requests to visit plants in the US. Then, the

[6]Letter from Seiichi Mishima, the Dalian Branch, Mitsubishi Corporation to the Manager, the San Francisco Branch, "Mantetsu Bujun Tanko Kogyokacho Okamura Kinzo shi goshokai no ken (On introduction of Mr. Kinzo Okamura, Department Chief of the Fushun Coal Mining Industry, the South Manchuria Railway)," 2 August 1924, in "Letters of Introduction," RG131, Entry42, Box375, NARA.

headquarters informed branches in North America of his intention to visit.[7] Director of the Fuel Division, the Mitsubishi Corporation sent a letter to the San Francisco branch describing this point.[8]

> The gentleman [Kinzo Okamura] is an engineer from the South Manchuria Railway and is dispatched to Europe for the procurement of kerogen shale that is currently attracting attention, and on the way to Europe, he said that he wants to visit the Avon Refinery of the Associated Oil Company. For our company, taking care of him would greatly favor us in procuring kerogen shale machines and selling related products, and if we fail to do so, he would be attended by Mitsui & Company on a visit to a General Petroleum Corporation.

The letter reports that Kinzo Okamura wanted to visit the Avon Refinery of the Associated Oil Company, from which the Mitsubishi Corporation had imported oil, and also warns that Mitsui & Company had approached him. The General Petroleum Corporation, California, granted exclusive sales rights in Japan to Mitsui & Company. Therefore, the Mitsubishi Corporation suspected that Mitsui might invite Okamura to visit a General Petroleum plant.

The director of the Dalian branch of the Mitsubishi Corporation also sent a letter to the director of the San Francisco branch, noting that:[9]

[7]Letter from the Headquarters, Mitsubishi Corporation to Fukusaburo Ueno, the Manager of the New York Branch, Mitsubishi Corporation, "Mantetsu Bujun Tanko Kogyokacho Okamura Kinzo shi no ken (On Mr. Kinzo Okamura, Department Chief of the Fushun Coal Mining Industry, the South Manchuria Railway)" in "Letters of Introduction," 16 August 1924. RG131, Entry42, Box375, NARA.

[8]Letter from Kazushige Tsutsumi, Division of Fuel to Shuzo, Shimatani, the Seattle Branch, 19 August 1924, in "Letters of Introduction". RG131, Entry42, Box375, NARA.

[9]Letter from Seiichi Mishima, Director of the Dalian Branch, Mitsubishi Corporation to the Director of the San Francisco Branch on "Mantetsu Bujun Tanko Kogyokacho Okamura Kinzo shi goshokai no ken (Introduction of Department Chief of the Fushun Coal Mining Industry, the South Manchuria Railway)" in "Letters of Introduction," 2 August 1924, RG131, Entry42, Box375, NARA.

> Although Mr. Okamura is originally an electrician (who earned a Bachelor of Engineering from the Imperial University of Tokyo), he is sent on a serious mission for the procurement of machines for the currently planned kerogen shale industry of Fushun,... when the project is finally implemented, given the circumstances, he is also expected to hold a prominent position, and so we should of course horn in, and he is substantially important person, in order to be prepared for the planning of the second term, and thus, we would like you to attend him sufficiently.

Meanwhile, branches of Mitsui & Company also shared information about Kinzo Okamura. Seko, the director of the London branch of Mitsui & Company, sent a letter to the Seattle branch.[10]

> Mr. Kinzo Okamura, Department Chief,... plans to visit Britain to make a decision on procurement for the oil shale plant currently planned by the South Manchuria Railway, and according to the Dalian branch, he is going to depart Yokohama on August 19... We expect that the director of the Division of Machinery and the director of the Dalian branch have also requested that you attend him, and this is not only for this particular project, but he is very important person to our company such that, although we understand that you are busy, we dare to ask you to attend him particularly kindly when he passes through your city. Takada & Company and some others would surely pursue him and so please be careful not to be outdone by them.

In the end, Mitsui succeeded in being the only one to attend Okamura, and the Mit-

[10]Letter from Seko, Supervisor of the London Branch, Mitsui & Company to the Manager of the San Francisco Branch, "Mantetsu Kogyokacho Okamura Kinzo shi no koto (On Mr. Kinzo Okamura, Department Chief of the Fushun Coal Mining Industry, the South Manchuria Railway)," 31 July 1924, RG131, Entry64, Box3, NARA.

subishi Corporation failed to approach him in the US. On the West Coast, the director of the San Francisco branch of Mitsui & Company exclusively attended Okamura, and other companies such as the Mitsubishi Corporation could not approach him.[11] Then, Okamura traveled to New York via Chicago. The New York branch of Mitsui & Company reported on this visit as follows.[12]

> Responding to the requests from the gentleman [Okamura] and by our suggestions, we are ready to attend him in visits to many plants. Although Takada & Company also sent staff to Chicago, it seems to be simply to attend him for sightseeing.... However, engineers from the Mitsubishi research division have already been studying oil shale for several years... and have substantially rich data and other materials on the issue to be considered by him, but we have heard that Mitsubishi started late on this issue.

Kinzo Okamura traveled to the US in 1924 to visit refineries in California and other sites. Representatives of the San Francisco and New York branches of Mitsui & Company attended his visits.

The New York branch of Mitsui & Company noted this in a letter to the London branch on 24 October 1924 as follows.[13]

> Regarding the trip plan of Mr. Kinzo Okamura, we talked to the San Fran-

[11]"Ryokaku dosei annai jo (Summary of states of visitors)," Entry 67, Container2, Seized Sundry Dept. Correspondence of Mitsui and Co.(San Francisco) Re Imports, Exports and Sales;1919-1941, NARAN.

[12]Letter from Department of Machinery, Division of Machinery, the New York Branch, Mitsui & Company to the London Branch of Division of Machinery, "Mantetsu Bujun tanko hikiai yubo ketsugan kanryu sochi narabini Okamura gishi no koto (On inquiry of the oil shale retort facilities by Fushun Coal Mine, the South Manchuria Railway and Engineer Okamura)," 2 October 1924, RG131, Entry64, BOX3, NARA.

[13]Letter from Tokujiro Hirata, the New York Branch, Mitsui & Company to Supervisor Seko, the London Branch, "Mantetsu Bujun Tanko hikiai yuboketsugan kanryu sochi no koto (On inquiry of oil shale retort facilities by the Fushun Coal Mine, the South Manchuria Railway)," 2 October 1924, RG131, Entry64, BOX3, NARA.

> cisco branch and dispatched our staff to Chicago and attended him in visiting many plants and carefully watched his behaviors. However, from Chicago and to the West, there are no retorting facilities for kerogen shale, so we attended him to visit the retorting facility of the Ford Motors in Detroit and for others, mainly the pulverized coal burning equipment of electric power plants and some others... According to Engineer Okamura, regardless of whether the "Hartman" or "Dillon Oil Company" or "Reed Holdings" method, this technology is still in the research stage, so it should not be immediately sent to Fushun to be built up. In summary, he seems to want to visit there [London] as soon as possible and wants to study the "Simon-Carves"[14], which we recommend, and the "Craig"[15], which Takada & Company promotes, and other Scottish systems, and he wants to hear detailed reports from engineers who are already there or are dispatched and then proceed to concrete decision-making.

Emanuel W. Hartman acquired patents for oil shale equipment in 1925: patent 1,537,114 was for a gas-extracting apparatus; patent 1,546,659 was for a shale distilling apparatus; and patent 1,608,597 was for an annular hearth oven (Klosky, 1949, 109, 114, 138). Although Okamura was interested as an engineer in new technologies being studied in the US, he did not consider them appropriate for procurement. In contrast, with the long history of the Scotch oil shale industry, British manufacturers seemed to be ready to supply reliable equipment types. In summary, as of 1924, after visiting

[14] A business jointly organized by Henry Simon and François Carves in 1878 (Dickinson, 1943). Currently, Simon Carves Engineering Limited is a subsidiary of the ECI group, which is a subsidiary of Mitsui Engineering & Shipbuilding. https://ecigrouponline.com/simon-carves-engineering/ Accessed February 15, 2022.

[15] A.F. Craig & Company, Limited, 1866–1982, Paisley, Renfrewshire, Scotland. University of Glasgow Archive Services https://archiveshub.jisc.ac.uk/data/gb248-ugd173/1-15andgb248ugd185 Accessed February 17, 2022.

plants in the US and before visiting plants in Britain, Okamura considered the Scottish method the most reliable and tentatively supported it.

Meanwhile, Tadao Kimura, a researcher in the Central Laboratory of the South Manchuria Railway, traveled in the other direction through Europe and arrived in the US in February 1924 to visit various plants. The New York branch of Mitsui & Company reported on Kimura's visit in a letter as follows:[16]

> Mr. Tadao Kimura, Engineer of the South Manchuria Railway, visited this city on February 25 on the way back from London to Tokyo... He talked with us on kerogen shale... He considered the Hertman Process to be more worth studying than... Mr. Okamura did as well and reported it to the headquarters of the South Manchuria Railway. Given that the South Manchuria Railway ordered Mr. Kimura to study the process, we expect that the South Manchuria Railway is paying substantial attention to the method. The gentleman has not been attended by Mitsui much for some reason, so we have noted this but, unlike last time, this time, he seems to be comfortable with Mitsui. This seems to be because the London branch made an effort and because of the failure of Takada & Company.[17] We knew we should not miss this opportunity, and so we attempted to approach him.

When Kimura returned to Yokohama, Japan from the US, the Department of Mining in the Tokyo Branch of Mitsui & Company contacted him and reported their meeting to the Department of Machinery in the Dalian Branch on 20 April 1925.[18]

[16]Letter from Department of Machinery, the New York Branch, Mitsui & Company to Department of Mining, Division of Machinery, the Tokyo Branch, "Mantetsu hikiai yuboketsugan kanryu sochi no koto (On inquiry of oil shale retort facilities by the South Manchuria Railway)," 26 February 1925, RG131, Entry64, Box2, NARA.

[17]Takada & Company was in a financial crisis at that point.

[18]Letter from the Department of Machinery, the Tokyo Branch, Mitsui & Company to the Department of Machinery, the Dalian Branch, "Mantetsu gishi Kimura Tadao shi yuboketsugan kanryusochi

1. His assessment of the British retorting facilities for kerogen shale.

   His behaviors in the UK were as the London branch has reported each time, and his critiques of manufacturers of the facility in the country are mostly as follows. Regarding "Craig" & Co. Ltd., with which Takada has a relationship, and "Simon-Carves", which our company recommends, Mr. Kimura seems to firmly consider "Craig" & Ltd. to be the best manufacturer. While "Craig" & Co. Ltd. has already produced "oil shale" facilities for Sottish Oils Ltd. and is generally recognized as the manufacturer proficient in the industry, "Simon-Carves" Ltd. has never produced these kinds of facilities... It should be unquestionable that we should choose [Craig & Co.]... he seemed to implicitly indicate our company could switch [to Craig & Co.]

2. His critiques of German producers.

   The "Thyssen"[19] method Mitsubishi recommends is not worth thinking about at all. Regarding this, I [Kimura] pointed out each demerit in the face of expatriates of Mitsubishi stationed in Germany. Although Mr. Katsuyama at Mitsubishi defended it as much as possible, his scientific study was extremely primitive, and none of his defenses were persuasive. The internal heating retort facilities by "Mondgas"[20] that Mitsui recommends are not so interesting to me [Kimura]; he [Kimura] only said (he might have avoided cri-

shisatsu kicho dan no koto (On talk by returning Mr. Tadao Kimura, Engineer of the South Manchuria Railway)," 20 April 1925, RG131, Entry64, Box2, NARA.

[19]Thyssen, established in 1867, merged with Krupp, established in 1811, to create Thyssenkrupp in 1999.

[20]Deutsche Mondgas- un Nebenprodukten Gesellschaft, Berlin.

tiques because it was to my [a Mitsui's staff's] question). In general, none of the German facilities were in fact invented for "oil shale" but were only for the low-temperature retorting of coal. Facilities developed for coal could surely be utilized for "oil shale" after minor changes in design. However, while experimental facilities of such applications to "oil shale" are being attempted in various places to see if they are practically workable, there are very few plants of commercial scale other than in the UK, which makes us imagine how different "oil shale" is from coal. Meanwhile, I [Kimura] admit that German products are sophisticated and superior to the others in extracting byproducts. Therefore, there should be debates regarding whether the South Manchuria Railways is to adopt German products immediately.

3. Products in the US.

   I [Kimura] returned to Japan through the US and was ordered to visit and observe the "Hartman" method[21] and "Trumble" method.[22] I [Kimura] am concerned that "mechanical troubles" could occur with both the "Hartman" method and the "Trumble" method. In particular, the "Hartman" method is still under study, and I [Kimura] cannot imagine that the current model could be utilized for the "shale" of Manchuria. However, the "Trumble" method has a substantial advantage in coal retorting.

[21] Hartman Rotary Continuous Retort by Hatman Syndicate Co., Ashland, Oregon (Hamor, 1925, 156–157).

[22] Trumble Oil Cycle Distillation Plant by Trumble Oil Shale Cycle, Co., Alhambra, California (Hamor, 1925, 166).

> In summary, during the talk, Mr. Kimura, in general, still intends to argue for the construction of a large-scale plant using the "Scottish" method. Meanwhile, he seemed not to appreciate Mr. Okamura very much and talked as if he assumed the authority for [procurement of] this [shale oil retort] facility... Executive officers of the South Manchuria Railways would surely value suggestions from Mr. Kimura, and hence, we would like you to carefully approach him.

Regarding the US method, the Hartman rotary continuous retort adopted external heating (Hamor, 1925, 157), and the Trumble oil cycle distillation adopted internal heating using "superheated steam" (Lyder et al., 1925, 290). As Kimura mentioned, coal retorting had been well established (Fischer, 1924, 76–80). The issue was whether its application to kerogen shale retorting was feasible.

In summary, Kimura prioritized reliability and recommended Simon-Carves, which had worked with the Scottish oil shale industry, and Kimura did not think highly of the German Mondgas. Additionally, Kimura did not appreciate Okamura, who later came to prefer the internal heating system suggested by Mondgas. As described in section 2.3, Okamura took the lead in developing an internal heating system in 1925. However, as of 1924, Kimura valued the Scottish external heating technology. As cited above, Okamura also considered the Scottish method the most feasible before his visit to Britain.

Mitsui & Company also contacted other members of the committee. When Kanji Kurihara from the navy visited the US between 23 and 28 October 1924, on his way back from Europe, the New York Branch attended him and coordinated his visit to shale retort facilities that were using the Hartman method. When Keido Uehara from the navy stayed in Los Angeles from 2 to 10 October 1924, the headquarters and the New York Branch arranged his visit to oil fields in California. Thus, engineers belonging

to the navy also visited sites in the US in person and acquired tacit knowledge there [23].

The headquarters and the Dalian Branch of Mitsui & Company closely shared information regarding the procurement policy of the South Manchuria Railway. The Dalian Branch of Mitsui & Company analyzed the prospective procurement policy of the South Manchurian Railway in March 1925 while requesting information on competitors about which the headquarters might have better knowledge, such as the following.[24]

> While products from continental Europe have also been under study [by the South Manchurian Railway], it is still speculated that the "Scottish" method is largely the most promising, also given our relationship with the navy. Among the "Scottish" method facilities, it is currently unpredictable whether "Simon-Carves", whose agent we are, or "Craig" & Co., whose agent is Takada & Co., will be procured, and furthermore, there is not yet a consensus even among people in charge within the South Manchurian Railway. Since Takada & Co. has recently fallen into bankruptcy, it is naturally very unlikely that the South Manchurian Railway will procure the facilities of "Craig" & Co. [from Takada $ Co.], and therefore, the Mitsubishi Corporation or another trading company will surely make efforts to replace Takada & Co. in importing "Craig" & Co. products and to obtain orders. Thus, at this moment, although we cannot directly approach "Craig" & Co., given the relationship with "Simon-Carves," it would seriously disadvantage us if "Craig" & Co. colludes with a powerful trading company like the Mitsubishi Corporation. So, what about making "Craig" & Co. tentatively collaborate

[23]The Seattle Branch, Mitsui & Company, "Ryokaku dosei annai (Summary of states of visitors)," RG131, Entry67, BOX2, NARA.

[24]Letter from Deputy Branch Manager, the Dalian Branch, Mitsui & Company, to Director of Division of Machinery, the Tokyo Branch, "Mantetsu Bujun Tanko yuboketsugan kanryu sochi no koto (On oil shale retort facilities of the Fushun Mine, the South Manchuria Railway)," 2 March 1925, RG131, Entry64, Box2, NARA.

> with Takada & Co and produce what "Simon-Carves" designs, or, if the South Manchuria Railway nominates "Craig" & Co., seeing whether there is room to negotiate with Takada & Co. to make Takada & Co. agree that we will deal "Craig" & Co.? Also, please tell us what you predict about the possibility that the Mitsubishi Corporation will work with Takada & Co.

The letter indicates where trading companies' efforts were going. As described in section 2.3, while the council decided to try the Scottish method first in 1925, engineers from the South Manchuria Railway, led by Kinzo Okamura, began experimenting with retort with internal heating in 1925. After the success of the experiment, the company built a retort system with internal heating in 1928 that began operating in 1929.

Trading companies were not involved in critical moments of such technical decisions. Instead, they were hunting for information regarding procurement candidates, and to obtain such information, agents of trading companies accompanied engineers from the South Manchuria Railway on visits to sites in the West. They arranged in-person visits to operating sites, which gave engineers tacit knowledge, and they delivered information about the prices of candidate facilities, which was critical for procurement. Logistical support to match potential suppliers around the globe with clients at home was how trading companies addressed asymmetric information between the demand and supply sides.

5 Conclusion

There were two feasible options for the South Manchuria Railway: the reliable but energy-wasting Scottish external heating system and an internal heating system that was possibly less expensive but still only under development. The former was supported

by the navy, the primary customer of the produced oil. Leading engineers of the South Manchuria Railway preferred the latter for its profitability.

What Mitsui & Company and the Mitsubishi Corporation did during the selection process was provide logistical support for the staff of the South Manchuria Railway in visiting advanced facilities in operation. Engineers of the South Manchuria Railway had the knowledge to evaluate facilities they observed in person and did not need technical advice from trading companies. However, they absolutely needed to observe facilities in person. Mitsui and Mitsubishi logistically supported such "business trips" to establish "face-to-face" relationships (Miller, 2003).

Such requests could be met only by the largest trading companies, such as Mitsui and Mitsubishi, which had global networks and experiences in brokering procurement by the Japanese government and large Japanese companies. Unless their Western counterparts actually recognized the possibility of procurement supported by proven trading companies, they would not have coordinated in-person visits. Without their networks across the West, they could not have logistically supported the staff from the South Manchurian Railway. Once a deal was made, logistical support was rewarded in the form of a commission.

Rauch (1996a,b, 1999, 2001), Rauch and Watson (2004) theoretically conjectured that Western empires, extended ethnic networks through immigration, and Japanese and Korean general trading companies are substitutes that convey information that is essential for trades of differentiated goods. A critical question regarding this conjecture is what, then, general trading companies were truly doing in the studied period. If the knowledge of general trading companies' staff about the differentiated goods as expertise is critical, such a function cannot be substituted by an imperial or immigration legacy, which implies just that British, French, or Chinese offshoots share a language or

culture with heterogeneous backgrounds but not technical expertise. Our case study on procurement by the South Manchuria Railway for its oil shale retort facilities indicates that the role of trading companies that was considered essential by the client company's engineers was not engineering knowledge but logistical support for the client company's engineers to reach at operation sites in the West. Such connections could be substituted by the network of the British empire, the French empire, or the Chinese network because what was critical was connections with other people at such operation sites. Therefore, our case study supports the prediction by Rauch (1996a,b, 1999, 2001), Rauch and Watson (2004). After all, having India and Singapore as friends, and (probably better) substitutes of Mitsui and Mitsubishi, a general trading company would be unnecessary to the UK.

We admit that our study has a limitation. We present just one case. We need many more case studies to formally support the conjecture by Rauch (1996a,b, 1999, 2001), Rauch and Watson (2004). Additionally, there may have been cases where the expertise of general trading companies' staff was truly appreciated by their clients. Inquiry into such issues is left for future research.

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