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The Effects of the Petroleum Industry Development on the Local Economies[1)]

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The similarities and differences between Niigata and Akita prefectures in terms of the way in which the petroleum industry developed and its effect on local economies are as follows: First, the main similarity was that the development of the petroleum industry played a major role in the creation of ironworks and other related industries. Then, the first difference was related to the business leaders. While companies founded by local wealthy people and entrepreneurs contributed to the development of the petroleum industry in Niigata, business enterprises run by local citizens in Akita ended in failure and companies from other prefectures that were already relatively large were the ones that caused the industry to grow. The second difference was in the supply and demand of labor. While the local labor force was absorbed in Niigata and mine workers from other prefectures were not accepted, a large number of workers immigrated to Akita from Niigata.

JEL Classification: N3, N6, N7, N9
Keywords: Petroleum Industry, Supply and Demand of Labor, Creation of Related Industries

Introduction

This paper focuses on the development of the petroleum industry, and in particular the mining sector, in prewar Japan. It also aims to study its effect on local economies by comparing Niigata and Akita prefectures, which were leading production areas. The period of time subject to this study is between the 1870s and the 1920s.

History of the Japanese Petroleum Industry and Its Characteristics

Table 1 shows the changes in supply (≒demand) of petroleum products. From this table, it can be seen that kerosene used for lamps was the main petroleum product in demand up until the 1910s. Although it is not necessarily clear from the table, the demand for kerosene was surpassed by that for light oil first and then by that for heavy oil during the 1920s. These types of oil were used for fishing boats, factories and other fuels. It was not until the late 1920s that the demand for gasoline used for automobiles and other purposes increased dramatically.

Next, Table 2 shows the changes in the supply of kerosene, which played the leading role in oil demand for many years, and its percentage by country. It is,

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Table 1. Changes in Supply (Consumption/Sales) of Petroleum Products (unit: kl)

Year	Gasoline	Kerosene	Light Oil	Heavy Oil	Machine Oil
1900	3,004	314,294	12,940	61,367	13,971
1905	6,345	306,042	31,380	93,353	24,956
1910	1,948	341,319	39,819	61,812	29,915
1915	13,012	236,700	99,945	154,014	59,753
1920	52,979	167,088	122,745	41,390	89,009
1925	136,355	142,721	n.a	n.a	153,848
1930	555,060	144,726	227,997	1,091,908	206,111

Data: Appended chart from *100-Year History of Nippon Oil Co.*
Note: Volumes represent the volumes of imports and production for 1900 – 1910, consumption for 1915 – 1920, supply for 1925 and sales for 1930.

Table 2 . Kerosene Supply and Changes in Ratio by Country (unit:100 boxes, %)

Year	Foreign Oil			Domestic Oil Production	Kerosene Supply	Domestic Oil share
	Import Volume of Foreign Oil	Ratio of Import by Country				
		USA	Russia /Dutch East Indies			
1885	17,636	100.0	0.0	n.a	n.a	n.a
1890	42,663	84.7	15.3	n.a	n.a	n.a
1895	44,152	54.3	45.7	n.a	n.a	n.a
1900	67,842	71.4	28.6	15,085	82,927	18.2
1905	58,703	62.8	37.2	22,046	80,749	27.3
1910	68,968	68.4	31.6	21,089	90,057	23.4
1915	35,947	79.1	20.9	26,506	62,453	42.4
1920	34,462	86.8	13.2	9,993	44,455	22.5
1925	27,187	71.4	28.6	12,833	40,020	32.1

Data: Historical Data of Yokohama City Vol. 2, *Japan External Trade Statistics (revised edition); Japan Compendium of Economic Statistics.*

however, necessary to note that foreign traders were importing finished products and not crude oil at that time. In this table, the numbers for the USA are primarily from SOCONY (Standard Oil Company of New York) and those for Russia/ Dutch East Indies are from Rising Sun Petroleum Co. (Royal Dutch Shell). It can therefore be seen that the shares held by these two foreign oil companies were large.

It is, however, also clear that domestic oil production was considerably high, especially in the 1900s and 1910s. In this paper, emphasis is placed on this point.

Up until the 1910s, domestic companies were primarily engaged in the development and refinement of domestically produced crude oil. The import of crude oil and its refinement did not begin in full scale until the 1920s. Nippon Oil Co. played the leading role in the development of domestic oil wells (Table 3). By

Table 3. Domestic Crude Oil Production of Nippon Oil Co. and Its Ratio (unit: kl)

Year	Nippon Oil Co.(A)	National Total(B)	A/B(%)
1890	890	9,813	9.1
1895	2,805	26,967	10.4
1900	48,754	138,375	35.2
1905	42,091	214,147	19.7
1910	79,161	290,070	27.3
1915	258,791	463,306	55.9
1920	140,954	351,792	40.1
1925	259,856	295,380	88.0
1930	240,737	310,411	77.6

Data: Appended chart from *100-Year History of Nippon Oil Co.*
Note: The total values may differ from those in Table 4 because the sources are different.

merging with Hoden Petroleum Co., which had been just as competitive as Nippon Oil Co. until the 1910s, the position of the company in the domestic makers became overwhelmingly dominant.

Looking at the locals in Japan where crude oil exploitation was conducted (In this paper, "locals" refer to prefectures or municipalities in principle), it can be seen that production was extremely high in Niigata until about 1910 and in both Niigata and Akita after that (Table 4).

Table 4 . Changes in Crude Oil Production by Prefecture (unit: kl)

Year	Hokkaido	Akita	Niigata	Nagano	Shizuoka	Total including Others
1895	74	29	26,375	58	462	27,000
1900	3	14	137,834	50	475	138,376
1905	1,010	98	212,374	75	591	214,147
1910	341	2,331	286,886	11	476	290,070
1915	1,474	160,150	301,257	31	319	463,306
1920	1,406	159,910	190,193	32	217	351,792
1925	8,738	140,397	146,099	30	95	295,380
1930	16,690	108,058	191,746	28	31	316,560

Data: *Statistical report of the Department of Agriculture and Commerce; Trend of Japanese Mining; History of the Mining Trends of Japan.*

Based on the above discussion, this paper compares Niigata and Akita (Fig. 1), the two leading production areas, in terms of the development of the petroleum industry (primarily of the mining sector) and its effect on local economies. More specifically, it discusses the similarities and differences between the two prefectures, with a focus on the following three points – (1) details of development (including the conditions of leading companies and the product markets that supported them), (2) supply and demand of labor and (3) creation or revitalization

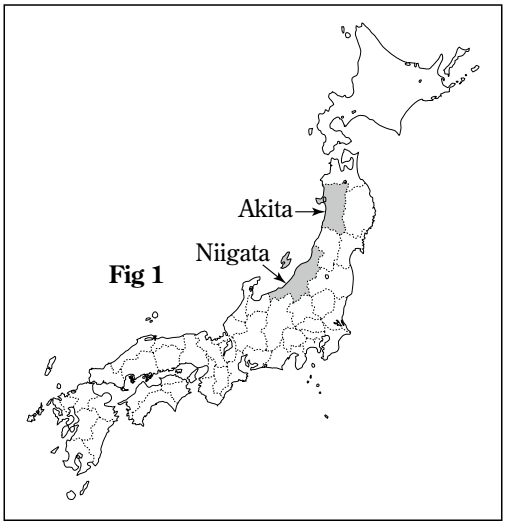


Fig 1

of petroleum-related industries (the oil refining industry is included here for the sake of convenience). Lastly, it summarizes the results of the above discussion and presents the prospects for the 1930s and onward.

Niigata

① **Details of Development**

In Niigata, Kashiwazaki City (Nishiyama oilfield, Nippon Oil Co. headquartered here), Nagaoka City (Higashiyama oilfield, Hoden Petroleum Co. headquartered here) and Niitsu City (Niitsu oilfield, Nakano Enterprise was located here) were the leading oil production areas (Fig. 2). In Niigata where crude oil had been exploited

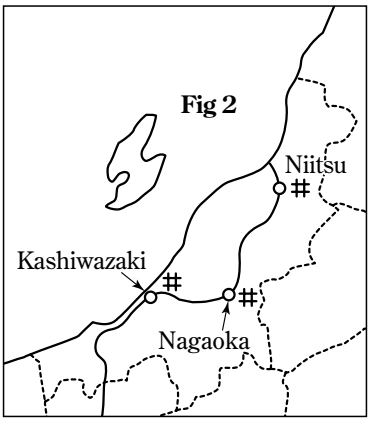


Fig 2

since the Edo Period, active business development mainly by local citizens began in the Meiji era following the abolishment of the feudal system. In the 1870s and 1880s, however, most of the pioneering business activities launched by Shuzo Ishizaka (founder of Nagano Oil Co.) and others ended in failure, and the private business of Nakano Enterprise at Niitsu oilfield was not necessarily a success at that time.

Starting in the 1890s and onward, the petroleum industry in Niigata was primarily expanded by two companies – Nippon Oil Co. and Hoden Petroleum Co. Nippon Oil Co. was founded in 1888 by bringing together wealthy people and landowners in the prefecture. The company proved successful with a capital of ¥150,000, which was a considerable amount of money at that time. Hoden Petroleum Co., which was founded in 1893 as a small company with a capital of ¥15,000, expanded through successful exploitation in its early years and repeatedly merged with other companies. The similarity for the two companies was the full-scale implementation of "machine mining" unlike conventional operations that mainly depended on "manual mining." Table 5 shows that the prevalence of

Table 5 . No. of Wells in Nishiyama Oilfield by Mining Method

Year of Commence-ment of Exploration	Machine Mining	Manual Mining
～1869	0	157
1870～79	0	212
1880～89	0	188
1890～99	77	107
1900～	192	4
uncertain	39	92
Total	308	760

Data: *Description of Area 3, Great Japanese Empire geological and geographical maps,* 1904.
Note: These figures are thought to be from the survey conducted until the first half of 1903. Abandoned wells are included.

machine mining dramatically increased in the 1890s and became the primary mining method in the 1900s. The two companies played leading roles in this trend. Nakano Enterprise also successfully introduced machine mining in the 1900s, and achieved the largest amount of crude oil production following that of Nippon Oil Co. and Hoden Petroleum Co.

Based on the development of the mining sector and that of the refining sector, which will be explained later on, the two companies launched sales of their products throughout the country. They were able to compete with the two foreign oil companies in Tokyo and in other domestic markets by the 1900s. The development of the two companies in those days was supported by the spread of lamps using kerosene, which was the main product in demand, among farm households. Until the two companies merged in 1921, they maintained the nature of local companies because, for both companies, a majority of the shareholders were Niigata citizens. Nippon Oil Co. moved its head office to Tokyo in 1914 as a result of the nationwide expansion of its business. In contrast, Hoden Petroleum Co. canceled the transfer of its head office due to the objection of the citizens of Nagaoka, despite the fact that the transfer had already been decided at a directors' meeting held in 1920.

② **Supply and Demand of Labor**

Although Niigata is an agricultural prefecture, population drain continued throughout the time period covered in this paper, mainly during the depression that affected farming communities in the 1880s. Under these circumstances, the developing petroleum industry absorbed many of the prefectural citizens as workers. The development of business thanks to the increase in machine mining (Table 5) resulted in the following two characteristics. First, the increase in demand for labor was limited because the role that machinery played in production was significant from the very beginning. Next, because "underground miners" to go underground for excavation became unnecessary, no workers came from metal or coal mines where there were many such workers. For the above reasons, workers in Niigata's petroleum industry were limited to Niigata citizens in principle.

③ **Creation or Revitalization of Related Industries**

First, the oil refining industry became prosperous with the development of the mining sector. It was rare for a refining section to be run privately as was the case for Nippon Oil Co. The oil refining industry of Niigata was characterized by the large number of oil refineries established as private business enterprises. Many of them were dissolved within several years or merged into Hoden Petroleum Co. There were many private enterprises that succeeded in manufacturing special machine oils (lubricating oils) by purchasing crude oil from Nakano Enterprise. Some of these enterprises founded later Daikyo Oil Co. and Showa Oil Co., which would be leading companies.

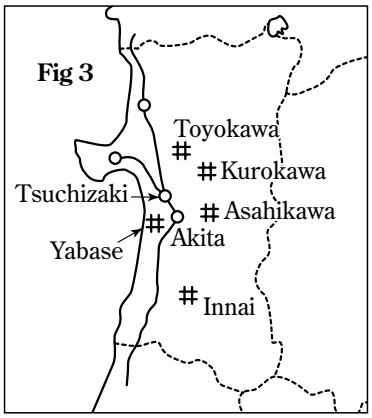
The ironworks industry was the next to develop, deriving from the repair and manufacturing of tools and machinery for the petroleum industry. A number of ironworks were established in addition to Niigata Engineering Co., which opened as an auxiliary enterprise of Nippon Oil Co., and the Nagaoka Association of Ironworks affiliated with Hoden Petroleum Co. In Nagaoka City, in particular, the ironworks industry became a leading industry. Affiliated manufacturers of Nippon Oil Co. and Hoden Petroleum Co. were also established for the production of sulfuric acid, which was used for cleaning during the oil refining process. Thermal power companies using heavy oil as fuel and manufacturers of the natural gas gushing out from oil wells were also established.

Akita

① **Details of Development**

In Akita, Minamiakita-gun (including present Akita City and Tsuchizaki Town; home to Kurokawa, Toyokawa, Asahikawa, Yabase and other oilfields) and Yuri-gun (Innai oilfield) were the production centers (Fig. 3).

Although local citizens launched private enterprises during the early Meiji era in the 1870s and 1880s even in Akita, they all ended in failure. In addition, members of the prefectural assembly, bank executives and other influential people formed the Akita Petroleum Investigation Committee in 1902, and conducted not only investigations, but also exploitation on their own by renting well drilling machines from the prefectural government. The Committee's activities were, however, not necessarily successful and ceased in 1913 because it did not have sufficient financial



funds and could not find wells that were particularly favorable.

The full-scale development of oilfields in Akita began with the advance of Nippon Oil Co. at the end of the 1900s. Soon after the company commenced exploration by taking over the Asahikawa mining area of the Investigation Committee, it established a large refinery and began to expand its business. In 1914, it succeeded in mining 10,000 *goku* (approx. 1,800kl) per day at Kurokawa oilfield, which was a record-high volume in Japan. Stimulated by the success of Nippon Oil Co., Hoden Petroleum Co., Kuhara Mining Co. and other companies began exploitation one after another in Akita, and this phenomenon was referred to as the "Kurokawa boom." It should be noted that all of these enterprises were companies with head offices in Niigata and Tokyo. Akita thus became one of the largest oil production areas along with Niigata in the latter half of the 1910s and onward (Table 4). While the demand for kerosene decreased during this period, that for light and heavy oils increased (Table 1). This conversion in oil demand contributed to the acceleration of the exploitation of Akita crude oil, which had a higher heavy oil content than Niigata crude oil.

② Supply and Demand of Labor

According to the records for the composition of workers in the Toyokawa mine of Nippon Oil Co. in 1926, 227 were from Niigata and 107 were from Akita out of the workers whose birthplaces were known. In the 1920s, the company moved surplus miners from Niigata – where the mining volume was stagnant – to Akita in groups of 50 or 100. It should be noted that there were many local people who worked during the agricultural off-season as "handymen" who were not recorded as miners. At least in the 1920s, the capacity for absorbing the local workforce was smaller in the petroleum industry of Akita than that of Niigata. The company, however, established training schools for miners in Toyokawa and refinery workers in Tsuchizaki at that time to increase the number of local workers. This was one of the reasons behind the increase in the number of workers from Akita in the 1930s. The above-mentioned miners from Niigata immigrated to Akita with their families. They then settled there and the populations of municipalities with mines therefore increased.

③ Creation or Revitalization of Related Industries

Regarding the oil refining industry, Nippon Oil Co. first established the Akita Refinery in Tsuchizaki in 1910, and achieved Japan's first continuous distillation method five years later. The location of the refinery was decided because of Tsuchizaki's transportation facilities, such as a port and a railway station, as well as the enthusiastic campaign of the people of what was then Tsuchizaki Minato Town to invite the refinery for local revitalization. The Tsuchizaki plant of the Niigata Engineering Co. was also established. In 1920, the Akita Refinery of Hoden Petroleum Co. also began its operations. The oil refinery industry of Akita mainly consisted of enterprises owned and operated by large, mining-based companies such as Nippon Oil Co. and Hoden Petroleum Co., and unlike Niigata, there were few private enterprises.

The creation of the ironworks industry along with the development of the petroleum industry is a characteristic similar to that of Niigata. Ironworks that produced oil well drilling or refinery-related equipment were established newly or by the extension of business activities by "blacksmiths." Some of the workers at the Tsuchizaki plant of Niigata Engineering Co. became independent and established ironworks of their own after the closure of the plant in 1926. In the mining industry, civil contractors were also active in road maintenance and leveling, the construction of sheds and other works around the wells before their opening. Lumbering, which was a traditional industry in Akita, was also revitalized thanks to the demand for lumber used for the construction of drilling derricks and shacks.

Conclusion

The similarities and differences between Niigata and Akita prefectures in terms of the way in which the petroleum industry developed and its effect on local economies are as follows: First, the main similarity was, in short, that the development of the petroleum industry, and in particular the mining sector, played a major role in the creation of ironworks and other related industries.

There were, however, two differences. The first difference was related to the business leaders. While companies founded by local wealthy people and entrepreneurs contributed to the development of the petroleum industry in Niigata, business enterprises run by local citizens in Akita ended in failure and companies from other prefectures that were already relatively large were the ones that caused the industry to grow. The second difference was in the supply and demand of labor. While the local labor force was absorbed in Niigata and mine workers from other prefectures were not accepted, a large number of workers immigrated to Akita from Niigata.

Lastly, the prospects for the 1930s and onward will be presented. Further expansion of the mining industry was not seen in Niigata due to the decrease in oil resources. In Akita, the Yabase oilfield was newly developed, and the mining industry expanded after surviving the stagnant trend that occurred in the late 1920s (Table 4). Workers from local areas also increased in number. It can be said that the petroleum industry of Akita gradually changed its direction to take root in local areas. Starting in the late 1930s and onward, however, intervention by the national

government in the petroleum industry intensified as it became an important industry for the war economy. This led to the conscription of oil engineers and miners to Southeast Asia and other places as well as the dilapidation of oil wells due to unreasonable increases in production. It is presumed that the war economy brought about new changes to the petroleum industry and local economies of Niigata and Akita.

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