

Industrial Location in Japan since 1945

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Abstract: This paper outlines the main changes in industrial location in Japan since the end of World War II. After a brief introduction, the paper discusses the growth of industrial regions between 1955 and 1965, and gives particular attention to the establishment of heavy industrial complexes in coastal locations and to the growth of assembly-line industries in inland locations. Some reference is also made to the role of local government inducement policies. The paper then turns to an examination of trends since 1965, and considers the significance of external diseconomies, changes in local government policy, labour shortage, improvements in transport and communications, and regional development policy. The paper argues that these factors have been responsible for a limited dispersal of manufacturing away from the main industrial regions. In conclusion, the paper briefly considers the implications of current economic trends for industrial location.

Introduction

One of the salient features of the geography of Japan is acute shortage of habitable land. Cultivated land accounts for only 16 % of the total area of Japan, while over 70 % of Japanese territory consists of largely uninhabited mountains and rugged uplands (Kokudo-cho, 1975). Yet the population of Japan, which in 1978 amounted to 115 million, ranks as the sixth largest in the world. Density of population per unit area of cultivated land is higher than in other major industrial countries, and Japan's post-war industrial growth has occurred in the context of very scarce land resources.

Moreover during the last 100 years, industrial activity in Japan has been largely concentrated within a corridor, often termed the Pacific Belt, which stretches from the Kanto plain to N Kyushu (Fig 1). In 1970, this axial zone contained 87 % of Japan's industrial output by value, and 70 % of the Japanese population. However the geographical concentration of population and industry is even greater than these figures suggest, for within the Pacific Belt, the bulk of industrial production is located within the three conspicuous bay-head conurbations of Keihin, Hanshin, and Chukyo, centring on Tokyo-Yokohama, Osaka-Kobe, and Nagoya respectively.

This geographical pattern of manufacturing has persisted since the beginning of Japan's industrial revolution in the 1880s. Even before the onset of industrialization in Japan, population and economic activity were concentrated within the Pacific Belt: the early commercialization of the pre-modern Japanese economy, based as it was on the growth of cash cropping and associated handicrafts, was mainly limited to the Osaka region and to the plains bordering the Pacific, from Ise Bay to the W extremity of the Inland Sea. When in the middle of the 19. century Japan opened her doors to trade, and began to modernize her economy upon Western lines, industrialization proceeded fastest within the Pacific Belt, especially in those areas close to the largest domestic markets and close to important harbours, such as Yokohama and Kobe, through which vital exports and imports were funnelled. The paucity of fuel and mineral resources in Japan also helps to explain the concentration of industry within the Pacific Belt. Although there was some development of coal-based industry in Kyushu and Hokkaido, the small Japanese coalfields did not attract concentrations of population and economic activity large enough to offset the importance of the Osaka, Tokyo, and Nagoya regions. Until the early 1930s, it was the cotton textiles industry which led Japan's industrial expansion,

and the location of cotton textiles was determined not so much by access to coalfields, but more by the availability of labour and capital, and by access to markets, both domestic and foreign. During the 1930s, the increasing control of the state over economic policy probably contributed towards the growing concentration of heavy industry within the environs of Tokyo, and by 1940 Keihin had emerged as the most important industrial region of Japan. Meanwhile the establishment of armaments factories and coastal naval refuelling bases at locations throughout the Pacific Belt also helped to perpetuate the tendency for manufacturing to be concentrated within the Kanto-North Kyushu corridor.

Since 1945, the degree of concentration of industry within the Pacific Belt has not varied significantly, apart

from the immediate postwar years when the main industrial regions were still recovering from the effects of wartime bombing. Nevertheless, important changes in industrial location have occurred within the Pacific Belt since the end of WW II. Some of these changes, such as the tendency for heavy industry to locate on land reclaimed from the sea, have been associated with acute land shortage and with other circumstances largely specific to Japan. Others, such as the increasing importance of the market as a factor in industrial location, are by no means unique to Japan, and may be observed in other industrial countries.

During the period of postwar inflation and economic reconstruction which lasted from 1945 to 1950, the prewar pattern of industrial location remained basically unchanged. But although there was no dramatic areal expansion of industry, changes occurred in the relative importance of the main industrial regions of Japan. Until 1950, for example, the Hanshin region, centred on Osaka and Kobe, replaced Keihin as the most important industrial region of Japan. This short-lived improvement in the position of the Hanshin region may be attributed firstly to the relatively rapid postwar recovery of the textiles industry, which since the late 19. century had been predominant in the industrial structure of Osaka, and secondly to the fact that war damage had been slightly less extensive in Hanshin than in the Keihin region (Kawashima, 1967). For similar reasons, industrial output in the Chukyo region recovered more quickly than in the Keihin region. In all of the industrial regions of Japan, however, there was only a gradual and partial recovery of manufacturing. Until the outbreak of the Korean War in 1950, industrial activity was mainly confined to the repair of war damage and to the provision of basic daily necessities.

With the outbreak of the Korean War, Japan entered upon a period of rapid industrial expansion, and the pattern of industrial location began to change in several important respects. Rapid industrial growth, especially from 1955 onwards, necessitated the development of new sites for manufacturing. In very broad terms, the areal expansion of industry was characterized by the creation of large complexes of capital goods industries, chiefly in coastal locations, and by the establishment of assembly-line industries in inland locations. Each of these trends will now be examined in detail¹⁾.

Coastal Complexes of Heavy Industry

One of the most striking features of industrial location in Japan since 1950 has been the tendency for the iron and steel, oil refining, petrochemicals, and thermal electric power industries to occupy extensive areas of reclaimed land along the coasts of the Pacific Belt. The establishment of coastal zones of heavy industry occurred in the context of important changes in the supply of energy and industrial raw materials. During the immediate postwar years, coal

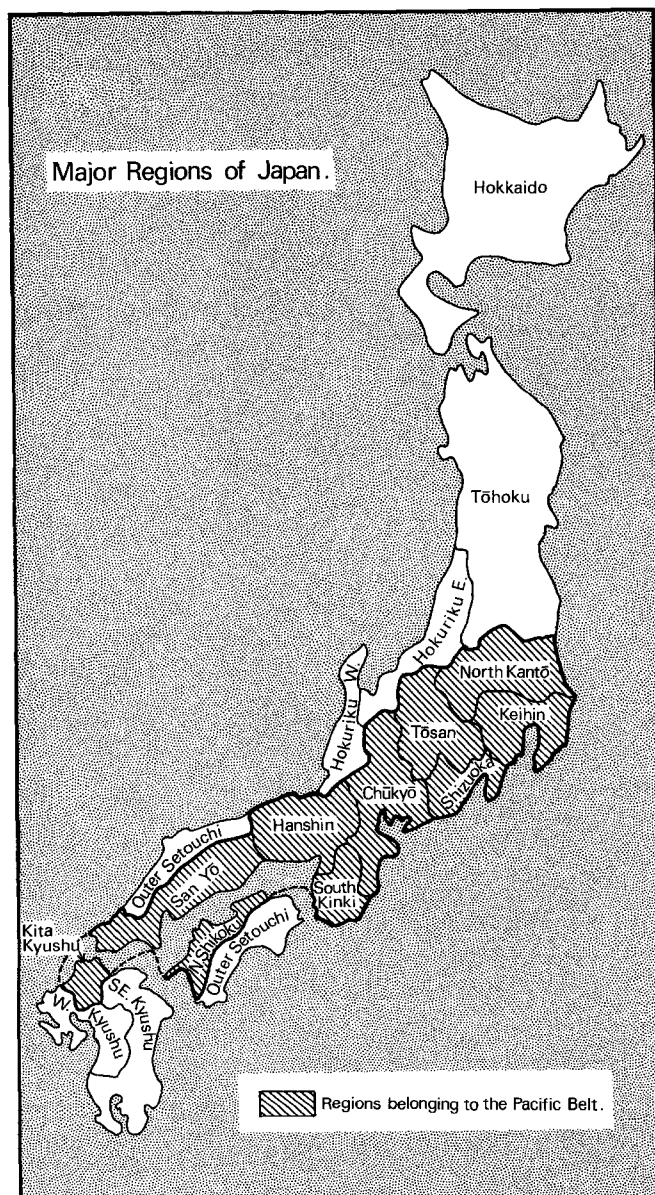


Fig 1

and hydro-electricity contributed almost all of Japan's energy supply. Japan, however, is poorly endowed with good quality coal reserves (Trewartha, 1965). In the two major coalfield regions (Kyushu and Hokkaido), the thinness and faulting of coal seams has greatly limited the extent to which mechanization can be introduced, and Japanese coal mining in the postwar years has remained a labour-intensive industry. From 1950 onwards, rising labour costs have rendered Japanese coal increasingly uncompetitive as a fuel. Rapid expansion of hydro-electric power output, meanwhile, has not been possible: by the early 1950s most of Japan's hydro-electricity potential had already been realized, and further increases in supply necessitated costly dam construction in remote mountain areas.

Against this background of limited domestic energy resources, Japan began to import oil from overseas. After 1955, the price of imported oil fell rapidly, reflecting the spectacular postwar growth in the output of the Middle Eastern oilfields and the reduction of freight costs associated with the advent of very large oil tankers. Accordingly, Japan turned increasingly to cheap oil as a fuel, and as a feedstock for the chemicals industry. By 1966, crude oil accounted for 60 % of Japan's primary energy supplies.

The burgeoning iron and steel industry, meanwhile, came to rely heavily on imported raw materials. By the early 1950s, it was clearly apparent that domestic resources of iron ore and coking coal were qualitatively and quantitatively insufficient to satisfy the growing demands of the steel industry. After the Korean War, the introduction of bulk carriers enabled Japanese steel manufacturers to turn to distant overseas suppliers of minerals, and by 1969, imports accounted for 95 % of iron ore consumption and 80 % of coking coal consumption.

With the growing reliance of Japan upon imported fuels and raw materials, firms manufacturing capital goods opted increasingly for coastal locations. In the absence of large quantities of cheap land, there was little alternative but to embark upon the large-scale reclamation of land from the sea. From 1950 to the late 1960s, extensive tracts of the coastline of Japan were transformed by reclamation schemes²).

Coastal land reclamation has been heavily concentrated within the Pacific Belt. Most major reclamation schemes have been undertaken in locations which afford access to the main domestic markets, and the availability of good road and rail links with the main industrial regions has been a consideration of prime importance. At the same time, the precise location of reclamation schemes has often been determined by factors of physical geography. Land reclamation from the sea has been possible only in areas where inshore waters are shallow enough to permit straight forward reclamation by the dredge-and-fill method, and where the underlying geological formations are of sufficient strength to bear the weight of heavy industrial plant.

In the majority of cases, land reclamation schemes have been associated primarily with the iron and steel, oil refining, and petrochemicals industries³). For each of these manufacturing industries, the location of plant on reclaimed land has been highly advantageous.

In the case of the iron and steel industry, for example, land reclamation has furnished sites large enough to enable steel-making companies to enjoy economies of integration and economies of scale. Reclaimed land, moreover, has often been tailor-made to suit the particular requirements of steel manufacturers. The typical Japanese iron and steel works thus occupies an area of reclaimed land which is laid out in such a way as to allow for deep-water anchorages adjacent to the works (for unloading imported raw materials) and for the arrangement, in rational sequence, of coke ovens, sintering plants, blast furnaces, LD converters, continuous casting mills, and rolling facilities.

Similarly, the reclamation of land from the sea has been of crucial importance in providing sites for oil refining and petrochemicals manufacture. Some land reclamation schemes have been specifically designed to cater for the needs of petrochemicals complexes and in many cases, land has been laid out so as to allow the most rational arrangement of the various units which make up the complex.

Coastal industrial complexes in which there is a close juxtaposition of interdependent plants are referred to in Japanese as *konbinaato*, a word of Russian derivation (Hayashi and Watanabe, 1968). This term describes not only oil refining and petrochemicals complexes, but also steel-based complexes which as well as iron and steel manufacture include additional industries such as thermal electric power generation and chemicals, the latter being dependent on coke oven gas and other by-products of the steel works⁴). Some *konbinaato*, such as those at Kashima and Tomakomai, are arranged around large and newly excavated harbours. Most *konbinaato*, however, occupy blocs of reclaimed land.

The extensive areas of reclaimed land which accommodate the *konbinaato* are very often the product of heavy investment by local governments. From 1950 until the late 1960s, prefectures and cities along the coast of the Pacific Belt from Tokyo Bay to N Kyushu competed fiercely to attract heavy industry, and showed a remarkable willingness to provide necessary facilities such as land, water supplies, and road and railway links. Where land reclamation schemes were undertaken, local governments were also involved in the payment of substantial sums to compensate fishermen for the loss of inshore fishing grounds.

In many cases, expenditure on facilities for industry (including land reclamation) greatly surpassed spending on housing, education, and welfare (Miyamoto, 1973). During the early 1960s, Aichi prefecture, for example, invested heavily in land reclamation, road and railway construction, and harbour improvement, chiefly in connection with its scheme to attract the iron and steel industry into the Nagoya

area. The very high priority given to industrial inducement policy is reflected in the prefecture's budget for 1965. In that year, the "development budget", which includes the cost of providing roads, harbour facilities, industrial water supplies, and reclaimed land, amounted to 36 % of total prefectural expenditure. Education and social welfare, by contrast, accounted for 29 % and 17 % of prefectural expenditure respectively (Yamamoto, 1965). Similar examples of heavy spending on industrial inducement policies could be quoted for many prefectures and cities throughout the Pacific Belt. Indeed nearly all of the large-scale coastal complexes of heavy industry built in Japan since 1950 have involved generous local government subsidies of one kind or another. In all cases, the cost to the local community in the short term if not in the long term, has been very considerable.

Industrial Location in Inland Zones

A second major trend in industrial location in Japan has been the growth of manufacturing industries in inland locations. Between 1950 and the late 1960s, this trend was particularly conspicuous in the fringes of the three main industrial regions. In Kanagawa, one of the constituent prefectures of the Keihin region, some 1,470 ha of factory sites were developed in inland locations (mainly inland from Yokohama and Kawasaki) between 1956 and 1963 (Yamamoto, 1965). During the same period, new inland factory sites amounting to 848 ha were established in Chiba prefecture, mainly in locations to the E of Tokyo. In Saitama prefecture, meanwhile, the pace of factory development accelerated, especially along major roads leading N out of Tokyo. To some extent, the development of factories in the inland fringes of the Keihin industrial region during this period may be attributed to restrictive land use planning measures adopted by local governments within the Tokyo Metropolitan Region. Local laws enacted in 1959, for instance, greatly restricted the further expansion of industry within the ward area of Tokyo, and in the cities of Musashino and Mitaka. In 1965, similar controls on factory development were applied to the built-up area of Yokohama, and to parts of Kawasaki (Yamamoto, 1976). The response of firms seeking land for factory expansion was to opt for locations outside the central built-up areas affected by the new land use legislation. In the Hanshin region, the rapid development of factory sites in the Yodogawa valley during the 1960s was also partly related to the introduction of restrictions on industrial expansion within the built-up area of the Osaka-Kobe conurbation⁵).

Between 1955 and the late 1960s, inland location of the kind referred to above became characteristic of a wide variety of industries, ranging from food processing to heavy engineering. In particular, however, many of the large factories which appeared in the fringes of the main conurbations during these years belonged to assembly-line

industries such as radio and television manufacture, electrical machinery, and motor vehicles.

Many of Japan's engineering industries developed rapidly during the 1930s, in close association with government-run armaments and munitions factories, and to some extent their postwar location reflects the tendency of pre-war military establishments to occupy inland locations. In the 1950s and early 1960s, though, the growth of assembly-line industries in inland locations was due to the operation of a number of factors, including the pull of the market (the three main conurbations of Japan represented concentrations of increasingly affluent consumers), the availability of land and skilled labour, and the need to maintain close links with concentrations of medium and small-scale components makers.

Japan's assembly-line industries rely to an unusual extent on large numbers of small parts manufacturers. In the motor vehicle industry, for example, there are currently over 8,000 parts manufacturers (Chang, 1974), and the major vehicle assembly plants, on average, purchase over 70 % of their components from outside firms (Miyakawa, 1977b). Many of the component firms are very small enterprises employing less than 300 workers, and most of them are located within the built-up areas of the main conurbations. In television and radio manufacture, and in the assembly of household appliances, there exists a similar dependence on sub-contract parts suppliers. Thus during the late 1950s and early 1960s, assembly-line industries opted for locations close to the main conurbations, which contained most of the small component manufacturers.

During the early 1960s, some local governments embarked on a policy of providing industrial estates, usually close to major assembly plants, for purposes of accommodating medium and small-scale enterprises. Indeed between 1961 and 1964, some 80 estates of this kind were constructed throughout Japan (Okuda, 1968). In Toyota, for instance, an industrial estate for medium and small-scale enterprises was completed by the city authorities in 1963. Occupying an area of 185,000 m², this estate contained 20 small factories, almost all of which manufactured parts for the nearby assembly plants of the Toyota Motor Company. By 1968, some 60 factories had been established in Toyota city as a result of local government inducement policies (Takeuchi, 1971). Industrial estates, some of which have been financed by the Japan Housing Corporation, have remained an important element in industrial location in Japan up to the present.

While dependence on city-based parts suppliers helps to explain the location of assembly-line plants close to conurbations, the extensive land requirements of the motor vehicles and electrical machinery companies necessitate locations in areas where land is both plentiful and cheap. During the late 1950s and early 1960s, abundant land at relatively low prices was still available in the margins of the main industrial regions.

Tab 1 Changes in the location of industry in Japan, 1950–1974 (Percentages of total national value of industrial output)

	1950	1955	1958	1961	1964	1970	1974
a Keihin proper = Tokyo and Kanagawa prefectures	21.8	24.8	27.4	29.2	30.8	29.6	26.8
b Keihin margins = Saitama and Chiba prefectures	18.8	21.5	24.2	25.3	25.4	22.1	18.6
c Hanshin proper = Osaka and Hyogo prefectures	3.0	3.3	3.2	3.9	5.4	7.5	8.2
d Hanshin margins = Kyoto and Shiga prefectures	23.5	23.2	23.7	24.0	22.4	20.8	19.4
e Chukyo proper = Aichi prefecture	20.5	20.2	20.8	21.0	19.6	17.7	16.3
f Chukyo margins = Mie and Gifu prefectures	3.0	3.0	2.9	3.0	2.8	3.1	3.1
g North Kanto = Ibaraki, Tochigi and Gumma prefectures	11.1	12.4	12.3	12.2	12.4	12.7	12.7
h Tosan = Yamanashi and Nagano prefectures	7.1	8.7	9.0	9.0	9.0	9.2	9.0
i South Kinki = Wakayama and Nara prefectures	4.0	3.7	3.3	3.2	3.4	3.5	3.7
j Sanyo = Okayama, Hiroshima, and Yamaguchi prefectures	56.4	60.4	63.4	65.4	65.6	63.1	58.9
k North Shikoku = Ehime and Kagawa prefectures	3.0	2.9	3.2	3.6	3.7	5.2	6.0
l Kitakyushu = Fukuoka prefecture	1.6	1.6	1.4	1.3	1.4	1.7	1.9
m Tohoku = Aomori, Iwate, Akita, Yamagata, Miyagi, and Fukushima prefectures	1.8	1.9	1.7	1.6	1.6	1.9	1.9
n East Hokuriku = Niigata and Toyama prefectures	3.7	3.9	3.7	3.8	3.8	4.0	4.2
o West Hokuriku = Ishikawa and Fukui prefectures	6.6	6.0	6.1	6.2	6.5	6.8	7.7
p Outer Setouchi = Tottori, Shimane, Tokushima, and Kochi prefectures	3.1	1.9	1.9	1.8	1.8	1.9	2.1
q Western Kyushu = Saga, Nagasaki, and Kumamoto prefectures	5.6	4.8	4.9	4.1	3.4	2.7	2.7
r South East Kyushu = Oita, Miyazaki, and Kagoshima prefectures	3.5	3.2	2.8	2.6	2.5	2.2	2.4
	4.0	3.7	3.3	2.9	2.8	3.2	3.7
	3.5	2.8	2.7	2.6	2.5	2.6	2.8
	2.0	1.5	1.2	1.2	1.2	1.4	1.3
	1.5	1.3	1.2	1.1	1.0	1.0	1.3
	1.9	1.7	1.7	1.3	1.1	1.2	1.5
	1.8	2.2	1.3	1.2	1.1	1.1	1.6
	—	—	—	—	—	—	0.2
All Japan	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sources: Tsusho Sangyo-sho: Wagakuni Kogyo no Chi-iki Kozo, 1967, pp. 9–10, Ritchi Kogai Handobukku Henshu linkai, 1976, Ritchi Kogai Handobukku, p. 40

Changes in Industrial Location since 1965

As Tab 1 shows, the growing concentration of manufacturing within the three main industrial regions of Japan remained a salient feature of industrial location until the mid-1960s. Thereafter, however, a variety of interrelated factors began to render the large industrial regions increasingly unattractive from the viewpoint of firms seeking new locations for factory development. Foremost among the factors militating against the further expansion of the main industrial regions were external diseconomies, ranging from traffic congestion to pollution.

During the early 1960s, rapid industrial growth necessitated increased investment in the infrastructure, and road and railway networks and harbour facilities were steadily improved, especially within the main industrial

regions. Yet such was the pace of economic growth that these measures fell far short of solving severe problems of congestion. By the mid-1960s, vehicle ownership in Japan was rising rapidly, especially within the conurbations. In Tokyo prefecture, for example, the rate of increase in registered motor vehicles during 1965 amounted to 10,000 per month (Yamamoto, 1965). As traffic congestion worsened, so the transport of goods within the industrial regions slowed down. Many firms found it necessary to transport their goods by night to avoid daytime congestion (Kogyo Ritchi Sentaa, 1963).

Meanwhile the rapid expansion of the conurbations exacerbated the problem of land shortage, and land prices began to rise steeply. Between 1960 and 1970, the price of land in the six largest cities of Japan rose by six-fold (Yano Tsuneta Kinen-kai, 1971). The effects of high land prices

on factory location can be exaggerated: in Japan between 1964 and 1971, only 12.3 % of total capital investment by manufacturing industries was directed towards land purchase (Ritchi Kogai Handobukku Henshu Iinakai, 1976). Nevertheless, land prices combined with the growing shortage of land for factory expansion undoubtedly discouraged firms from locating in or close to the conurbations. Meanwhile the expense of reclaiming land from the sea began to escalate. Along the coast of Chiba prefecture for instance, the cost of reclaiming land rose from 3,300 yen/m² in 1961 to 13,200 yen/m² in 1965 (Yamamoto, 1965). Indeed after 1965, the pace of land reclamation from the sea slackened markedly.

Rapid industrial expansion also contributed to a sharp rise in the demand for water. Between 1958 and 1965, for example, the demand for industrial water in Japan rose from 23 million m³ per day to 49 million m³ per day⁶). Almost one half of industrial water consumption is concentrated in the three main industrial regions, where, until recent years, frequent recourse has been made to the extraction of water from subterranean gravel beds. In each of the three main industrial regions, over-extraction of underground water (not only for industry but also for use in the air conditioning of large buildings) has led to serious problems of land subsidence. During the 1960s, local governments began to apply restrictions to the extraction of underground water. The supply of reservoir and river water, meanwhile, was not raised sufficiently to compensate for reduced supplies from underground. The main industrial regions have suffered not only from periodic water shortages, but also from a general deterioration in the quality of water, mainly as a result of pollution⁷). There can be little doubt that difficulties associated with water supply have helped to discourage the further expansion of industry within the three conurbations.

Perhaps the most publicized of the various external diseconomies which have affected the industrial regions of Japan is the atmospheric pollution associated with the growth of oil-based industries such as refining, petrochemicals manufacture, and thermal electric power generation. In the early 1960s, the massive development of these industries, all of which relied on sulphur-rich oil, inevitably gave rise to very high levels of sulphur dioxide concentration within the atmosphere. At the same time, the Japanese iron and steel industry had not yet begun to invest heavily in anti-pollution equipment, and smoke and dust released from coke ovens and furnaces contributed towards a worsening of atmospheric pollution⁸).

It should be borne in mind that much of the output of these pollution-producing industries has come to be concentrated within the main conurbations, and that owing to acute land shortage, it has been virtually impossible to separate large industrial complexes from residential areas. In 1975, the reclaimed land along the foreshore of Tokyo Bay contained some 16.5 million tons of annual crude steel

capacity, and 1.62 million barrels per day of refined oil capacity. Petrochemicals capacity, meanwhile, amounted to 2 million tons (ethylene equivalent). While by 1975 these industries were subject to severe controls on the emission of pollutants, the situation in the early 1960s was very different. The city of Kawasaki, where there had been unrestrained expansion of coastal oil refineries, petrochemicals plants, and steel works, was becoming synonymous with high levels of atmospheric pollution, and many of its inhabitants were beginning to suffer from various respiratory diseases associated with waste gases from industry, smoke and dust, and vehicle exhaust fumes. Nor were circumstances in the Keihin region exceptional: similarly high levels of pollution existed in Chukyo (notably in and around the city of Yokkaichi), and in the Hanshin region.

From the mid-1960s, the pollution problem attracted widespread concern within Japan, and was widely seen as symptomatic of the various social costs attendant upon rapid and unrestrained industrial expansion. Many citizens, especially within the industrial regions, began to question the validity of local government policy which seemed to be diverting expenditure away from housing and welfare towards public works schemes devised for the benefit of big business. Throughout the Pacific Belt, citizens' organizations were formed to combat pollution and other social costs of rapid industrial growth. By 1970, some 292 citizens' movements had been formed to protest against environmental pollution of one kind or another (Economic Planning Agency, 1976).

Furthermore, dissatisfaction with urban living conditions contributed towards a weakening in the support for the Liberal Democratic Party and in several industrial prefectures and cities, local government came under the control of opposition parties which were considerably less sympathetic to wholesale industrial growth. In accordance with these trends, local government policy towards industrial location underwent something of a *volte face*. In 1968, for instance, Chiba prefecture, hitherto a profligate provider of inducements to industry, prohibited the construction of a new oil refinery on the coast of Tokyo Bay. In the same year, Tokyo prefecture obliged the Tokyo Electric Power Company to sign an anti-pollution contract by which the company was required to achieve a drastic reduction in the discharge of sulphur dioxide from its power stations in the Tokyo region (Yano Tsuneta Kinen-kai, 1971). Since the late 1960s, environmentalist pressures and local government restrictions have operated as major constraints upon the expansion of pollution-producing industries in the main industrial regions.

Meanwhile, a growing labour shortage was beginning to influence the location of manufacturing, especially in labour-intensive industries. Between 1955 and 1961, the labour force in manufacturing had been growing at between 7 and 8 % per annum. This growth rate was sustained by a large-scale movement of labour out of low-productivity

sectors such as agriculture, and was reflected in the accelerating migration of population from rural areas to the urban and industrial regions. While migration continued at a high tempo, from 1963 the rate of increase in the industrial labour force fell to between 2 and 3 %, and a tightening of the labour market ensued (Honda, 1974). Labour shortage was to remain characteristic of Japanese industry until the recession which followed the oil crisis of 1973.

From the mid 1960s, labour intensive industries, already affected by land shortage within the main industrial regions, began to seek locations in less-industrialized regions of Japan, where residual pockets of underemployed labour could still be found. Access to parts suppliers remained an important consideration, and the preferred locations were those served by good road links with the conurbations. Many of the new locations were in regions such as North Kanto and Tohoku, from which access to Tokyo was relatively easy. As regards the manufacture of colour television sets, for example, new assembly plants were built between 1965 and 1969 at Fukaya in N Saitama prefecture (Toshiba Electric) and at Maebashi in Gumma prefecture (Nihon Victor). This marked the beginning of a trend: by 1975, over 30 television, radio, and audio equipment factories were located in North Kanto and Tohoku (Ritchi Kogai Handobukku Henshu linkai, 1976). In many cases, location close to rural areas was advantageous in respect of land requirements: not only were land prices lower than in the fringes of the conurbations, but assembly plants in semi-rural locations were able to employ farmers' wives on a part-time basis, and thus had no need to acquire extensive tracts of land for company housing.

Progress in road building and road improvement has been an essential prerequisite of the establishment of factories in less-industrialized areas, and during the 1960s, heavy investment in the road network of Japan began to bear fruit. Japan's first motorway, linking Kobe and Nagoya (the Meishin motorway) was opened to traffic in 1964, and the extension of this motorway to Tokyo (the Tomei motorway) was completed in 1969. Since then, substantial sections of motorway elsewhere in Japan have been opened to traffic. These include portions of the Tohoku Motorway (Kawaguchi to Sendai), Chuo Motorway (Nagoya to Tokyo via Suwa and the Kofu Basin) and Chugoku Motorway (Suita to Shimonoseki via Tsuyama). Since the late 1960s, interchanges on these motorways have functioned as important foci of industrial growth. On the Meishin motorway, for instance, interchanges at Komaki (N of Nagoya), Ritto and Kosei (both E of Kyoto) have attracted factory development (Miyakawa, 1977a). On those sections of the Chugoku motorway already opened to traffic, interchanges have begun to fulfil a similar role, notably in the interior of Okayama prefecture at locations such as Tsuyama, Ochiai, and Niimi (Kitagawa, 1976). Areas close to interchanges are favoured for factory location not simply because goods can be dispatched easily and swiftly via the

motorway, but also because interchanges are usually built in open countryside, where land for factory development is, at least initially, both plentiful and relatively inexpensive.

From the mid 1960s, then, external diseconomies, related changes in local government policy, labour shortage, and the development of motorways, have all contributed towards a lessening in the degree of concentration of manufacturing within the three main industrial regions of Japan. One more factor, however, needs to be considered in some detail. Since the early 1960s, the Japanese government has moved, albeit hesitantly, towards the implementation of regional development policy aimed at achieving a more balanced distribution of industrial output. The main stages in the formulation of regional development policy, and the impact of regional development policy on factory location, will now be outlined.

Regional Development Policy and Industrial Location

In the immediate postwar years, regional development policy in Japan was primarily concerned with the development of natural resources, and until 1960, little attention was given to the location of industry. The Income Doubling Plan introduced by Prime Minister Ikeda in 1960 originally advocated further industrial growth in the already congested coastlands of the Pacific Belt. But after prolonged debate within the Liberal Democratic Party, it was agreed that more consideration should be given to the rectification of regional disparities in incomes (Okita, 1965).

In the early 1960s, the government established 15 "New Industrial Cities" and six Special Areas for the Improvement of Facilities for Industrial Location⁹). While all of the New Industrial Cities lay outside the Tokyo-Osaka axis, four of the six Special Areas were located either within the central part of the Pacific Belt (East Suruga and East Mikawa) or in immediately adjacent districts (Kashima and Harima). Three of the New Industrial Cities (South Okayama, Toyo, and Oita) and two of the Special Areas (Bingo and Shunan) were located in the Inland Sea coastlands. While the New Industrial Cities were intended to function as foci for the growth of heavy industry in peripheral areas deficient in manufacturing, the Special Areas were located in districts already endowed with the infrastructure necessary for industrial growth, and where investment in manufacturing could be particularly effective (Ito, 1975).

With the exception of Matsumoto-Suwa in central Honshu, only those New Industrial Cities located in the Pacific Belt have successfully functioned as foci of industrial growth. In South Okayama and Oita, the inducements offered to industry as a result of New Industrial City designation have enhanced the already considerable advantages arising from location close to the major transport axis of Japan. In more remote areas, however, the New Industrial Cities have been far less successful.

The six Special Areas, all of which lie in the Pacific Belt, have been generally effective in promoting growth, the major exception being East Mikawa, to the SE of Nagoya¹⁰). Kashima, a Special Area on the coast of Ibaraki prefecture, contains an important steel making and petrochemicals complex.

In 1969, the government introduced its New Overall Development Plan (usually referred to in Japanese as the *Shinzenso*). This plan advocated the establishment of ultra-large industrial complexes in the outlying regions of Japan, and called for a dramatic expansion of the transport network. These proposals were later elaborated upon by Tanaka Kakuei (later to become Prime Minister of Japan) in his best-selling book "Remodelling the Japanese Archipelago" (Tanaka, 1972). In setting forth his ideas for achieving a radical redistribution of manufacturing within Japan, Tanaka proposed that five enormous complexes of heavy industry should be established in the peripheries of the country, at Eastern Tomakomai (Hokkaido), Mutsu-Ogawara (Aomori prefecture), Akita, Suo Bay, and Shibushi Bay (Kagoshima prefecture). In each of these remote areas, according to Tanaka, extensive areas of land should be provided to accommodate industries such as iron and steel, petroleum refining, petrochemicals, nuclear power generation, and other similar categories associated with pollution problems. The Tanaka proposals, meanwhile, envisaged a spectacular extension of the existing transport network, including motorways and rapid transit railways of the *shinkansen* type. Tanaka also argued in favour of developing a large number of industrial estates at inland locations throughout the provinces. These estates would accommodate labour intensive and non-polluting industries such as electrical machinery and light engineering, and in most cases their location would be determined by access to motorway interchanges and freight loading points on the railway network¹¹).

Although the resignation of Tanaka in 1974 seemed to signify the demise of his plan for remodelling the Japanese archipelago, several of the Tanaka proposals (based essentially on the 1969 New Overall Development Plan) have been carried forward. Of the five major complexes, some progress has been achieved in promoting the growth of heavy industry at Eastern Tomakomai (Ito, 1975) and at Mutsu-Ogawara (Kosugi, 1977), though on a smaller scale than was originally envisaged. Moreover, several inland industrial estates of the kind advocated by Tanaka are currently under construction¹²).

Furthermore, the Tanaka proposals provided the background for two regional development initiatives related to industrial location, namely the Law for the Promotion of Industrial Location in Agricultural Village Areas (1971) and the Law for the Redistribution of Industry (1972). Each of these laws aimed to give encouragement to trends which had already become apparent by the early 1970s.

Thus the Law for the Promotion of Industrial Location in Agricultural Village Areas was enacted at a time when mounting labour shortages were already impelling industry towards remote rural districts where pockets of under-employed labour remained to be exploited (Ito, 1974). Under the 1971 legislation, a variety of special financial inducements were offered to firms willing to establish factories in agricultural villages. Between 1971 and 1974, some 953 factories were built in agricultural villages under the aegis of this law (Ito, 1975). Many of the factories concerned belonged to labour intensive industries such as electrical engineering, metals processing, and textiles, and a high proportion of them were medium and small-scale enterprises. As already indicated, firms locating in rural districts typically employ farmers' wives on a part-time basis and pay relatively low wages. In cases such as textiles and ready-made clothing, location in the few remaining low-wage districts of Japan (that is, districts where members of farm families can be employed on a part-time basis) represents an attempt to stave off competition from cheap labour countries such as South Korea and Taiwan.

The Law for the Redistribution of Industry was chiefly aimed at encouraging the transfer of factories from over-congested city districts to locations in the provinces. Under this law, government grants and low-interest loans have been provided to help firms to transfer their operations from the main industrial regions. Once transfer is completed, the government and local authorities purchase the abandoned factory site which is then put to use in the context of urban redevelopment projects. Between 1972 and 1974, some 92 factories were transferred from the main industrial regions to locations in the provinces (Yamamoto, 1976). In 1972, the government also stepped up its assistance to firms willing to establish factories in coalfield areas severely affected by mine closures. In line with this policy, the Nissan Motor Company established an engine factory, in 1975, at Kanda on the coast of Fukuoka prefecture, a location which lies within one of the coalfield zones designated by the government for special aid (Fukuoka Tsusho Sangyo-Kyoku, 1978).

The latest stage in government planning for the location of industry reflects the impact of world recession upon the Japanese economy. Thus in November 1978, the Ministry of International Trade and Industry designated 16 areas as districts excessively dependent upon depressed industries (including shipbuilding, synthetic fibres, and aluminium refining). Firms located within these areas qualify for special government assistance (The Economist, 1978)¹³).

Conclusion

In summary, although manufacturing remains heavily concentrated within the Pacific Belt, significant changes in industrial location have occurred, especially since 1955. As

Tab 1 indicates, the early years of exceptionally rapid economic growth (1955 to 1965) were marked by a growing tendency for firms to locate their factories within the three major industrial regions of Japan. Among the factors responsible for this trend were access to the market, access to parts makers, and local government policies which gave high priority to industrial expansion. Since 1965, however, the relative importance of the three main industrial regions has gradually declined, chiefly as a result of external diseconomies, changes in local government policy, labour shortage, improvements in transport and communications, and regional development policy. Contrary to the intentions of official regional policy, the peripheral regions of Japan have not yet greatly benefited from this trend. Instead, as Tab 1 shows, regions such as North Kanto, Tohoku, and Sanyo (the coastlands of the Inland Sea), all of which enjoy relatively good communications with the Tokyo-Osaka axis, have been the chief beneficiaries of the redistribution of industrial output. That distance from the market remains a serious disadvantage is illustrated by the case of the Kitakyushu industrial region, the importance of which has fallen considerably since the end of WW II. Indeed, as Tab 1 shows, in terms of value of industrial output, Shizuoka prefecture (a prefecture located mid-way between Keihin and Chukyo) is now far more important as an industrial area than Kitakyushu.

As regards future trends, much depends on the ability

of Japan to respond to the complex changes brought about by recent fluctuations in oil supply, by economic recession in the United States and Europe, and by vigorous competition from newly industrializing countries such as South Korea and Taiwan. To maintain the competitiveness of Japan in the world economy, the Japanese government is now committed to the promotion of growth in knowledge-intensive high technology industries, including computers and other advanced electronics. These industries, it may be noted, produce high value in relation to energy consumed, and their future development offers a means whereby Japan may reduce her dangerously high imports of crude oil.

Should Japan succeed in restructuring her economy in this way, it seems probable that capital goods industries such as steel, petrochemicals, aluminium refining, and shipbuilding will become progressively less important. With the possible exception of the giant complexes planned at Eastern Tomakomai and Mutsu-Ogawara, it seems unlikely that many new coastal complexes of heavy industry will come into being. Indeed owing to a combination of environmentalist pressures and economic recession, the future of some of the existing complexes seems rather uncertain. Insofar as present trends provide an indication, high technology industries will most probably opt for inland locations, and given the gradual extension of Japan's motorway network, the slow dispersal of industry already noted in this paper seems likely to continue.

Footnotes

- 1) In view of the limited space available, this paper must ignore developments in old-established indigenous industries (silk-weaving, lacquerware, Japanese ceramics etc.) and in miscellaneous small-scale city industries such as toy making, leather goods, and publishing and printing. Both of these groups are characterized by a predominance of small-scale enterprises, often run on traditional lines.
- 2) A detailed geographical study of land reclamation in postwar Japan, illustrated by case studies, is provided by Flüchter (Flüchter, 1975). The present paper cannot do more than touch briefly on the significance of land reclamation for industrial location.
- 3) There are, however, plentiful examples of land reclamation for other industries, including shipbuilding (especially in NW Kyushu), cement manufacture (Ube) and motor vehicle assembly (Mizushima and Hiroshima).
- 4) The various industrial plants which make up the typical *konbinaato* are often related to one another in terms of capital linkages (Okuda, 1966).
- 5) From 1965, the establishment of new factories with sites of 1000 m² and over was prohibited by law within the built-up area of Osaka and Kobe (Yamamoto, 1965).
- 6) By 1971, consumption of fresh and sea water by industry had risen to 95 and 42 million m³ per day respectively (Ritchi Kogai Handobukku Henshu Iinkai, 1976).
- 7) Sea water, which is used by industry mainly for cooling purposes, was becoming heavily polluted by the mid 1960s, especially in Tokyo, Ise, and Osaka Bays.
- 8) The pollution problem has been the subject of long and anguished debate within Japan. For a balanced view of pollution and environmental problems generally, see Mills and Ohta, 1976.
- 9) The establishment of New Industrial Cities and Special Areas was preceded, in 1962, by the enactment of the National Overall Development Plan. This plan aimed to curb excessive congestion within the main industrial regions, and called for the development of new industrial sites in areas adequately furnished with supplies of land, water, and labour.
- 10) Industrial development in Eastern Mikawa made only slow progress until 1978, when the Toyota Motor Company began the construction of its Tawara assembly plant.
- 11) The Tanaka Plan helped to generate a wave of speculative land buying by the major Japanese corporations, many of which hastened to purchase land close to the proposed routes of motorways and *shinkansen* railway lines. The plan was indented as a major cause of high land prices and attracted widespread criticism in Japan (Sargent, 1975).
- 12) These are located at Yonezawa (Yamagata prefecture); Shoo (Okayama prefecture); East Saga (Saga prefecture); Izumo Nagahama (Shimane prefecture); Noto (Ishikawa prefecture); Esashi (Iwate prefecture); and Isahaya (Nagasaki prefecture).
- 13) This new initiative was in fact preceded by the drafting of the Third National Overall Development Plan (referred to in Japanese as the *Sanzenso*) in 1977. The *sanzenso* lays down guidelines for regional policy for the period up to 1990. This plan, insofar as it concerns itself with industrial location, stresses the need for continued dispersal of factories from the main industrial regions, and calls for further provision of industrial estates in the outlying regions of the country (Kokudochō, 1977).

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