REGIONAL DEVELOPMENT IN JAPAN: THE EFFECT OF TRANSPORTATION SYSTEMS ON INDUSTRIAL LOCATION DECISION

ANDREA OBERMAUER
Institute for Transport Policy Studies (ITPS)
Toranomon 3-18-19, Minato-ku, 105-0001 Tokyo, JAPAN

Abstract

In Japan, an efficient high-speed transport network (HSTN) has been built between and in the metropolitan areas of the Pacific coastal belt to meet the needs of a steadily growing concentration of economic, industrial, administrative functions and population. In the remoter regions, the transportation system has hardly been developed, causing disadvantages with respect to the capabilities of economic development with a continuous decline in population and a weak industrial agglomeration. The aim is to analyze whether the existence of a HSTN is sufficient to promote economic development and the growth of industrial locations in peripheral regions.

THEORETICAL BACKGROUND AND RESEARCH OBJECTIVES

"The transportation systems' power to shape and structure a national economy can influence the economic development of a region, because it has the capability to cause different development and growth in locations that had similar perquisites and is therefore a determining factor for emerging regional disparities" (Voigt, 1960). The impact of building new traffic routes as initiatives for regional development is rarely predictable or controllable and they have not always the desired effects. By connecting two diversely developed regions, the amenities of the economically higher developed region could be further increased whereas the towns in the less developed region could even suffer emigration of labor (Frerich, 1974; Nakamura/Ueda, 1989). However, there are various determining factors influencing the choice of location for companies. Frerich, Helms and Kreuter (1975) distinct objective location factors such as the condition of an industrial site, recruitment sources, facilities of transport and "individual factors", like individual company preferences. Furthermore, foot-loose industries and non-foot-loose industries with their different mobility ability for relocation must be distinguished. However, with a growing transport network the number of location independent industries is growing (Frerich,Helms, Kreuter, 1975). Proceeding from the approach of the capability of transportation systems to shape and structure a national economy, and taking into consideration regional disparities in Japan, the aim of the paper is to analyze whether the existence of high speed transportation systems suffices to promote regional economic development in peripheral regions.

The present status of regional disparities in Japan has been analyzed from a geographic and historical-political approach and an investigation of the regional development policy including transport system planning follows, in order to evaluate political measures towards a more balanced regional development. Then, the actual status quo of transportation networks and trends in location of industries are analyzed. The regions Tôhoku and Kyûshû have been chosen to evaluate the impacts of high-speed transport because of their peripheral location outside the agglomerations and because of their partial access to Shinkansen and/or highways. Growth rates in numbers of industrial location, of inhabitants and of employees are used as indicators to investigate the economic performance of these two regions for cities with direct access to the High Speed Transportation Network (HSTN), and areas without direct accessibility in the prefectures (jap.: *ken*) of Tôhoku and Kyûshû. The results will be compared for the time before (1970) and after (1995/96) the extension of the HSTN to these regions. Since there are various determinants which can influence the location decision it has to be emphasized that there is no mono-causal connection between the accessibility of HSTN and the changes of the indicators.

REGIONAL ECONOMIC PLANNING AND TRANSPORTATION INFRASTRUCTURE

Development from a geographical and historical-political perspective

The regional disparities between the major metropolitan areas Tôkyô, Nagoya and Ôsaka with extreme concentration of economic functions and population as agglomeration areas in the Pacific belt zone and the disadvantaged peripheral regions has often been explained as due to the impact of geographical structures and postwar economic growth. In fact, because of the mountainous character and the lack of plains in Japan, just 52.1% of the total surface can be used for settlement and only 27% is suitable for large industrial sites. In 1992, 44.8% of the Japanese population lived on 8.8% of the total surface (Lützeler, 1995). However, geographic preconditions cannot sufficiently explain how such agglomerations came into being, because also the historical-political development has determined the industrial and economic development in some privileged regions. In the 14th and 15th century, the so-called "castle towns" were almost evenly spread all over the country and were

the origin of many of the contemporary major cities like Sendai, Tôkyô and Fukuoka (Kokudochô, 1989). The politically motivated centralization of power in the Tokugawa-era (1600-1867) led to a polarized structure in which all national important political and administrative functions were concentrated in Edo (Tôkyô), whereas economic functions were concentrated in the Ôsaka area. In the Meiji-era (1868-1915), Tôkyô was promoted as an industrial center in order to speed-up the industrialization process and as a result of further governmental support for building up heavy industries, Tôkyô became a leading economic area in the first decades of this century. Therefore, the presently visible high concentration of all the important functions in the Kantô and Kansai regions did not just develop in the postwar economic growth period but is a consequence of an actively supported concentration process that started more than 300 years ago.

Main outlines of the regional development policy and transport system planning from the background of economic development

National development plans in the 1960s

It was only in the 1960s, that regional disparities between agglomerations and peripheral regions were regarded as a problem of national importance. The government initiated programs in order to support economic growth like the "National Development Plan" (*zensô*) of 1962. The plan implicated the expansion of the industrial zone into the entire Pacific coastal belt with Tôkyô, Nagoya and Ôsaka/Kobe as centers, but brought no change to the unbalanced spatial structure. Concentration was even accelerated by full utilization of the agglomeration advantages under the priority of national economic growth (Lützeler, 1994). In the years between 1964 and 1974, the Shinkansen lines and highways were built and extended in order to speed up the transport of persons and goods. In 1969, the "New National Development Plan" (*shinzensô*) followed to support the construction of new industrial sites, transport and communication networks (Kokudochô, 1987). The measures included an extension of transport infrastructures throughout the country. But the spatial concentration of economic functions in the agglomerations was already accepted as an irreversible fact.

The influence of economic changes on regional development planning and on migration tendencies in the 1970s

A change in location choice of production facilities towards peripheral regions only arose from a structural change of industry after the oil crisis in 1973. In particular the semi-conductor industry promised an economic and structural improvement - also in the remoter regions. The core industry for developing locations outside the agglomerations was the semi-conductor manufacturing industry (Suzuki, 1989). The location advantages in the Pacific coastal belt zone, such as concentration of all resources, proximity to the domestic markets and others were offset by increasing site disadvantages like high land prices and environmental problems. As a result, production facilities were relocated, favouring settlements in non-metropolitan areas. These changes led to the enactment of the "Third National Development Plan" (*sanzensô*) in 1977, for the creation of new industrial locations, by using passive decentralization measures such as impeding further concentration of industry and population in the metropolitan areas and supporting relocation of industry in peripheral regions by improving transportation and communication networks (Ôta, 1989). In the case of the transportation network, the priority was to improve existing routes (HMNK, 1990a). But with the beginning of the 1980s, the positive migration tendency into non-metropolitan areas came to an end and a renewed concentration especially in the environs of Tôkyô was observed.

New concentration tendencies and development plans in the 1980s

The new concentration tendency since the mid 1980s was limited to the Tôkyô metropolitan area because previous relocation of production facilities had left enough space behind for new offices and the expansion of Tôkyô's function as a financial center (Kiyonari, 1993). This phenomenum was

referred to as "'unipolar' concentration in Tôkyô" (jap.: *Tôkyô ikkyoku*). Because of this new situation, the "Fourth National Development Plan" (*yonzensô*) was enacted in 1987 (Tayama, 1995). The "Forming of a multipolar dispersed country" should foster investment and contribute to the creation of independent economic centers in peripheral regions. Accessibility should be achieved by building-up a national "one-day round-trip zone" that allows people to reach agglomerations and regional core cities in three hours, enabling people to make one-day business trips. As core measures 15 international airports and ports, highways and national routes should be built and extended to these regional centers. Furthermore, five new Shinkansen lines and the development of magnetic levitation lines were planned (HMNK, 1990b). But economic growth, which could be released by the expansion of the transportation network is dependent on the speed of realization of these projects: If the expansion should be delayed by further economic recession, it is very doubtful that relocation of industry in peripheral regions can continue.

Analysis of results of regional development planning

Concerning the results of regional development planning it can be concluded that none of the National Development Plans really led to a reduction of regional imbalance and regional disparities and actual problems in less developed regions and their individual capability for improvement have rarely been considered. The concentration in the Pacific coastal belt was not stopped but due to the plans' focus on the priority of economic growth, agglomeration trends have even been supported. Regional development plans always had the function of keeping in work the agglomeration regions (Lützeler, 1994; Flüchter, 1990). Another reason for the failure of development plans is the distribution of financial aid to local governments by giving "everyone" a slice of the budget, a method that cannot lead to an effective utilization of investments. If certain regions are supported it is often due to political and election reasons. Since Tanaka Kakuei as Japanese Prime Minister published his vision of the "remodeling the Japanese Archipelago" the support of regional development, mostly in the PM's home prefecture, has become nearly a tradition. Flüchter (1990) confirms a quite high effectiveness for these kind of measures to accelerate regional development, because it is one possibility to support ad-hoc investment in regions with weak infrastructures. Certainly, without Tanaka's vehement support for the construction of the Jôetsu-Shinkansen to his home-prefecture Niigata this line would not have been realized. Another point of criticism concerning regional development policy is the low sensitivity of ministries regarding the character of each region. Projects favored by local governments to meet certain regional needs can rarely be realized against the decision taken by ministries in Tôkyô. However, regional development policy only successfully adjusts regional disparities if it considers more individually the character and problems of the prefectures' economic development in peripheral regions.

ECONOMIC DEVELOPMENT AND INDUSTRIAL LOCATION DECISION IN TÔHOKU AND KYÛSHÛ

Status of intermodal transportation accessibility

In Japan, the transportation network is built in a linear but not radial structure in the Pacific belt zone. Therefore, many peripheral regions are not connected to the HSTN, and the zone in which people can make trips to any prefecture capital in three hours is limited to the agglomeration zones in the Kantô and Kinki regions. The zone in which more than 30% of the population can make one-day round-trips is limited to a corridor on the main island Honshû between the regions Tôhoku, Hokuriku, Kantô, Tôkai and Kinki. In North-Tôhoku and South-Kyûshû just 15-30% of the population can reach other prefecture capitals in-between three hours and most of the 47 cities that are in a more than three hours distance from a highway's interchange are located in West-Tôhoku and East-Kyûshû (HMNK, 1990b). In Kyûshû, only 27.6% of the population has direct access to the Shinkansen line in Fukuoka prefecture. Although a Kyûshû-Shinkansen line is under construction, most prefectures have still to rely on highways and their (in comparison to Tôhoku better) network

of airports (HMNK, 1990b). The main transport network in Kyûshû consists of the highways from Fukuoka to Kagoshima and Miyazaki in north-south direction and from Nagasaki to Ôita prefecture in west-east direction (Yamada, 1991).

The highway in Tôhoku, connecting Tôkyô with Morioka was built in 1977 and extended to Aomori "City" (jap.: *shi*) and Hachinohe-shi in 1987 (KKC, 1992). In 1982 the Tôhoku- and Jôetsu-Shinkansen were opened and since 1992, the Yamagata-Shinkansen Tsubasa connects Tôkyô and Fukushima with Yamagata-shi (UKKS, 1994). Although the transportation system in the Tôhoku region has been improved by connecting the region with the Kantô agglomeration area, the accessibility of regional core cities is limited to a small corridor at the main transport axis. The extension of the transport network to the north and along the Japan Sea side with cross connections will be necessary to improve the regions accessibility (HMNK, 1990b).

Relocation tendencies towards Tôhoku and Kyûshû

General reasons for location decision

Based upon the survey of the MITI (jap.: *Tsûsanshô*) carried out annually since 1967, focusing on location choice of manufacturing industry, it was found that, depending on the industry, the direction of relocation moves from sites in the agglomerations to their hinterland or to peripheral regions (Tsûsanshô, 1991). Considering the reasons for location decision, the transportation system is never explicitly mentioned by companies. But some of the location criteria such as the "proximity of the head office", the "proximity of traders", the "proximity of labor markets", the "proximity of markets" and the "availability of raw materials" imply reasonable transportation costs and the existence of fast transportation facilities, showing the importance of transportation systems for location choice. In North-Kyûshû, the availability of land is given as the most important factor for location choice in this region. The "proximity of markets of the head office" are the most important criteria for location in South-Tôhoku and the Kantô area (Tsûsanshô, 1995). Concerning South-Tôhoku, this result implies that the distance to head offices in Tôkyô is not regarded as an obstacle for location choice, since the advantage of relatively reasonable land prices is considered to be a more important criterium. As the results of regional location analysis show, South-Tôhoku is always among the preferred regions for location of industry.

Semi-conductor industry and automobile industry

Since the early 1970s, the industries establishing new facilities preferably in peripheral regions are the electronics and semi-conductor industry, the optical industry, certain branches of the chemical industry, the automobile industry, optical communications, the mechatronic industry (microelectronics and precision industry), biotechnology industry and others (Suzuki, 1989). The semi-conductor industry is mostly located in Kantô and in the regions Tôhoku and Kyûshû, a fact that led to the nicknames "Silicon Road" for Tôhoku and "Silicon Island" for Kyûshû (Economic Planning Agency, 1985/86). Both regions were qualified as location for this industry because of the supply of industrial sites, labor force, clean water and air, and the direct accessibility to the HSTN in some parts of the regions (Muraki, 1992). The semi-conductor industry in Tôhoku is located between the Tôhoku highway and the Kanetsu highway in the prefectures Fukushima, Miyagi, Iwate and Yamagata. The economic development in South-Tôhoku was positively influenced by the concentration process in the 300 km wide radial Kantô economic zone. In 1990, the Toyota Group expanded its automobile production facilities towards the Tôhoku region by setting up a large assembly plant in Kitakami-shi, Iwate prefecture. Other automobile manufacturers like Nissan and Isuzu followed. The expansion and set up of plants along highways and Shinkansen lines shows that the accessibility of HSTN in the region favored this location decision (Muraki, 1992). The location zone of industrial facilities in the Kyûshû region extends from Fukuoka prefecture to the eastern part of Saga prefecture and to the northern part of Kumamoto prefecture. Also in Miyazaki prefecture, some growth poles emerged with the location of new industries. A considerable part of new facilities

are production plants of the semi-conductor industry and local supplier companies. In the beginning, Kyûshû was the leading region for semi-conductor and other high-tech industries after Kantô, whereas at present Kyûshû is ranking behind Tôhoku in the number of plants. An increasing number of automobile production sites have been located in Kyûshû. Besides Honda, Nissan and Toyota have opened production plants in the Fukuoka prefecture, creating the third center of automobile manufacturing behind the Chûkyô and Kanto in North-Kyûshû (Matsuhara, 1995). However, since peripheral regions are traditional locations for labor-intensive manufacturing branches, increasing globalization causes competition not only among domestic areas for attracting companies but also with Asian low-wage countries. Both regions Tôhoku and Kyûshû, have this problem of competition with locations in Asia (Kiyonari, 1993). However, because of its advantageous geographical position, Kyûshû could function as a gateway for the East-Asian economic growth zone leading to an increase in location of industries with close ties to the continent (Kiyonari, 1995).

ANALYSIS OF ECONOMIC DEVELOPMENT OF TÔHOKU AND KYÛSHÛ IN SUBJECTION TO THE HSTN

In order to analyze the economic development of towns in Tôhoku and Kyûshû in subjection to the transportation network, areas and towns with and without direct access have been investigated. 51 towns in Tôhoku and Kyûshû with direct access to the HSTN were analyzed by their growth (or loss) concerning the number of industrial locations, population trends and number of employees. Then, these results were compared with the results for the remaining prefectural areas without direct access. As years of comparison, 1970 or 1972 were chosen for the time before and 1995 or 1996 for the time after the opening of the highways and/or Shinkansen lines (1977, 1982, 1992).

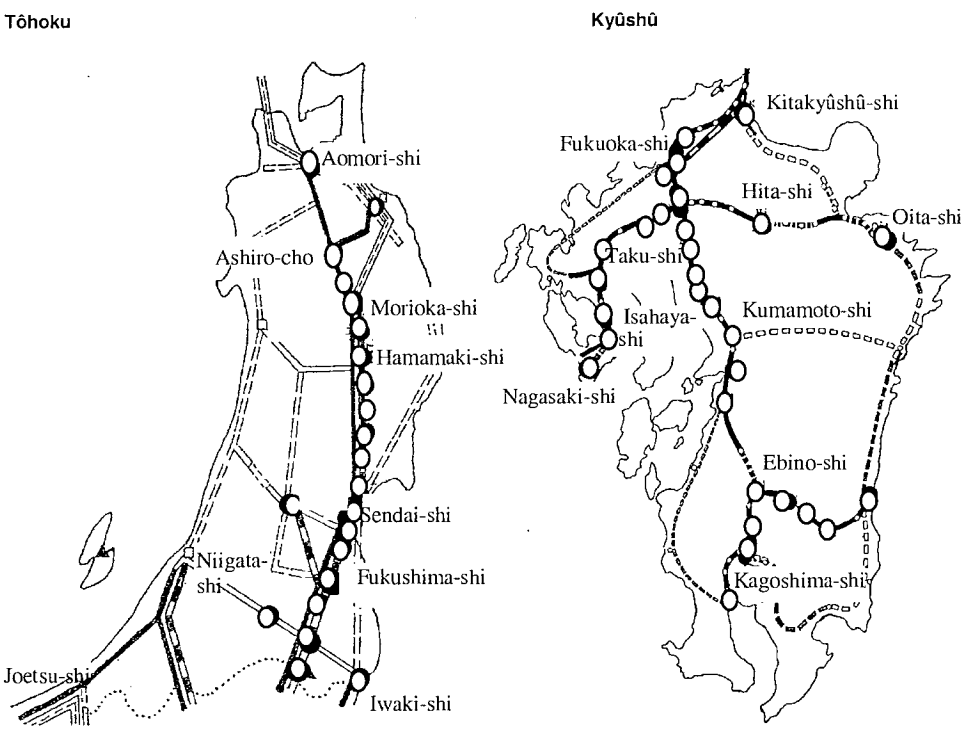

Figure 1 - Selected HSTN-towns in Tôhoku and Kyûshû

Tôhoku: Changes in number of companies, inhabitants and employees

Location of industry

Concerning the location of industries, the development in the number of companies was analyzed for cities and towns as prefectural areas with direct access to the HSTN in comparison to the remaining prefectural areas without access, for the time before (1972) and after (1996) the opening of the highways (1977) and Shinkansen lines (1982, 1992). The investigation is limited to the prefectures Aomori, Iwate, Miyagi, Yamagata and Fukushima, because Akita prefecture has no direct access to highways or Shinkansen.

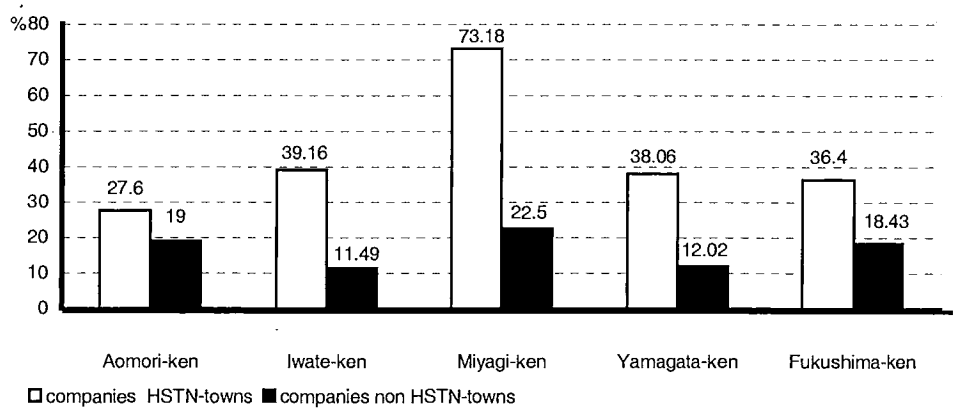

Figure 2 - Growth rates in the number of companies in towns with direct access to the HSTN in comparison to the other prefectural areas in Tôhoku, 1972-1996, in % (Obermauer, 1996; Sômuchô, 1996)

Regarding the numbers of companies, it can be observed that in towns with direct access to the HSTN the development was more positive than in the prefectural areas without direct access. Especially in the prefectures Iwate and Miyagi, but also in Yamagata-prefecture, the difference becomes evident in the growth rates of 39.2%, respectively 73.2% and 38.1% for areas with access compared to the areas without access to HSTN, which have a lower growth in number of companies (11.5%, 22.5% and 12%). As a result of the comparison of growth rates in number of companies in areas concerning their accessibility, in all Tôhoku prefectures, towns and cities with direct access are found to be preferred locations for companies.

Demographic development

The second indicator to valuate the influence of HSTN on the economic development of prefectures is the development in growth rates in the number of inhabitants for prefectural areas with and without access to HSTN. In all investigated prefectures, there is observed a decrease of inhabitants between 1970 and 1995 in towns without direct access to HSTN, with the exception of Miyagi prefecture. Here, also the highest growth rate for areas with direct access was reached. "These regions attract population from other regions where the location surplus is lower and as a result, their population is increasing...the rate of population growth for the five years around the opening of the Shinkansen in the Sendai region was nearly 5 percent higher than the national trend" (Nakamura/Ueda, 1989). Eight years after the opening of the highway between Aomori-shi and Morioka-shi and seven years after the opening of the Seikan-tunnel, in 1995, also in Aomori prefecture the population development is more positive in the HSTN-towns than in the other areas of the prefecture. However, the influence of the Tôkyô agglomeration is evident for most of the cities with access to the HSTN, depending on their distance to the agglomeration. In prefectures with long distance to the agglomeration zone, the population growth rate is high in the center towns like Sendai-shi, whereas the growth rate in other towns with access is lower.

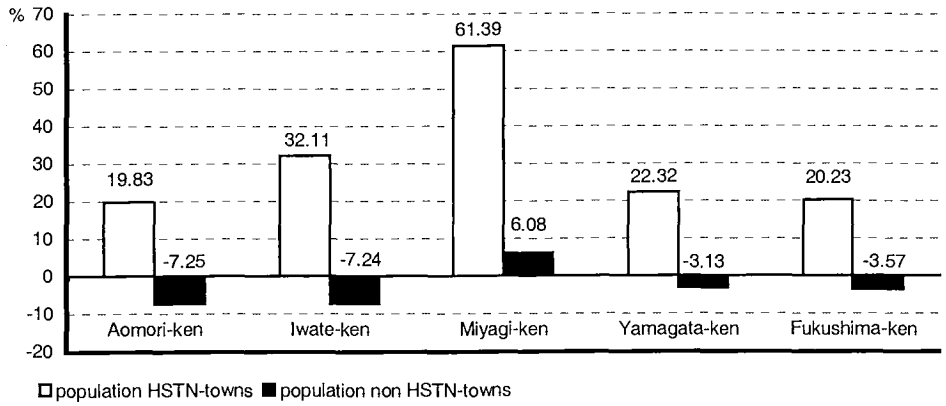

Figure 3 - Growth rate in the number of inhabitants in towns with direct access to HSTN in comparison to the other prefectural areas in Tôhoku,1970-1995, in % (Obermauer, 1996; Sômuchô, 1996)

On the other hand, in prefectures located closer to the Kantô agglomeration like Fukushima, all HSTN-towns show a high and positive population growth, whereas the areas without direct access show a decline in population. Towns and areas with access to the HSTN and a positive economic input from outside the region show a positive development in their population growth depending on their distance to this input source (e.g. the Kantô agglomeration zone). With growing distance to the input source, the influence declines and finally concentrates on few intra-regional center towns and especially on prefecture capital towns with access to the HSTN.

Development of employment

The third indicator to be investigated is the number of employees in HSTN-towns compared to prefectural areas without access to HSTN. Figure 4 shows the growth rate in the number of employees (15 years and older). Whereas the results for location of industries and number of inhabitants showed a clearly positive development for HSTN-towns, this is not always the case for the growth rate in number of employees. In Aomori and Fukushima Prefecture, the growth rate is higher in towns without direct access to HSTN. In Fukushima, this result could be influenced by the relatively short distance to the Kantô agglomeration and the positive influence of the economic growth zone around Tôkyô, that gives advantages to the whole Fukushima prefecture.

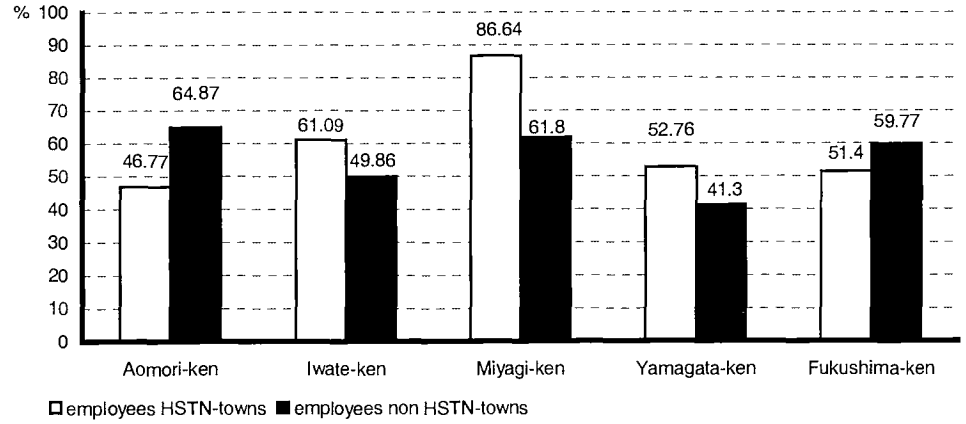

Figure 4 - Growth rate in the number of employees in towns with direct access to HSTN in comparison to the other prefectural areas in Tôhoku, 1972-1996, in % (Obermauer, 1996; Sômuchô, 1996)

Kyûshû: Changes in number of companies, inhabitants and employees

Location of industry

Comparing the growth rate for the number of companies over the last 25 years, it can be observed that in all prefectures in Kyûshû, the areas and towns with direct access to the Shinkansen and/or highways show a higher growth rate than the areas without direct access to HSTN. Concerning South-Kyûshû prefectures like Kagoshima and Miyazaki with a considerable large distance to the national agglomerations, just towns with direct access to the HSTN and a higher concentration of economic and administrative functions, especially prefectural capital towns, have an increase in the number of industrial locations, and their growth rate is actually higher than in HSTN-towns in the economically more developed part of North-Kyûshû.

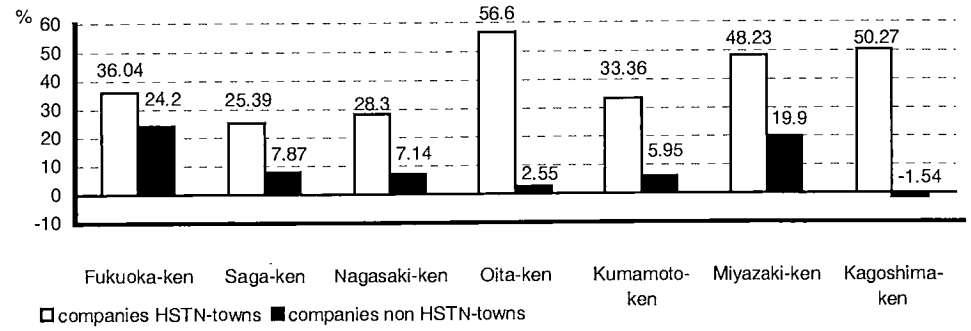

Figure 5 - Growth rate in the number of companies in towns with direct access to the HSTN in comparison to the other prefectural areas in Kyûshû, 1972-1996, in % (Obermauer, 1996; Sômuchô, 1996)

Demographic development

The growth rate in the number of inhabitants in prefectures in Kyûshû is similarly positive for towns with access to the HSTN. The only exception is Fukuoka-prefecture, where areas without access show a higher increase. This might be caused by high land prices in some towns with access like Fukuoka-shi or Kitakyûshû-shi. However, the positive growth in some HSTN-towns could not change the overall more positive result for non-HSTN-towns in Fukuoka-prfecture. In all other prefectures in Kyûshû towns with direct access to the HSTN are favoured for settlements, whereas areas without direct access suffered a decrease of inhabitants or a less intense growth between 1970 and 1995.

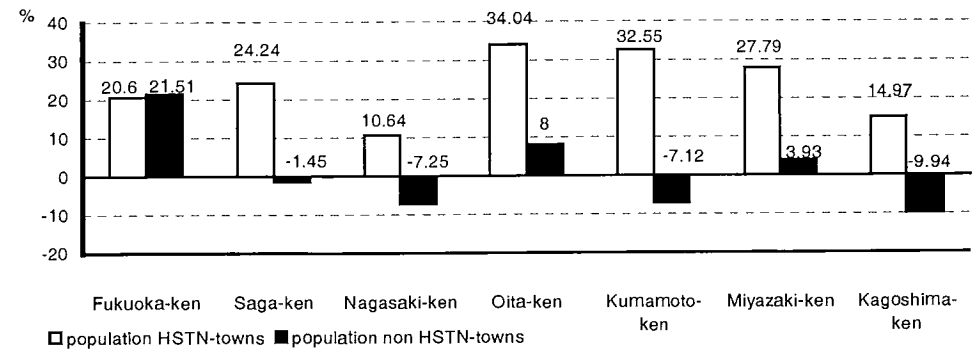

Figure 6 - Growth rate in the number of inhabitants in towns with direct access to HSTN in comparison to the other prefectural areas in Kyûshû,1970-1995, in % (Obermauer, 1996; Sômuchô, 1996)

In South Kyûshû, growth rates in number of inhabitants show a positive result for HSTN-towns, but this result is due to the growth almost only in the prefectural capital towns Kumamoto-shi, Miyazaki-shi and Kagoshima-shi, whereas only a few other HSTN-towns have a higher growth rate than prefectural areas without access to the HSTN. This implies that because of the long distance to the important agglomeration areas, in South-Kyûshû direct access to the HSTN is only sufficient for a positive growth rate if other positive preconditions like the concentration of administrative or economic functions in a prefectural capital town exist.

Development of employment

Concerning the changes of number of employees in each prefecture in Kyûshû between 1972 and 1996, all investigated towns and areas, irrespective of their direct access to the HSTN, show a positive result. However, in case of employees, the growth rate is not necessarily higher in towns with access like the results for Fukuoka, Nagasaki and Kumamoto show. Traditional industrial centers like Kitakyûshû in Fukuoka prefecture suffer from changes in industrial structure and show a weaker growth than non-HSTN-areas.

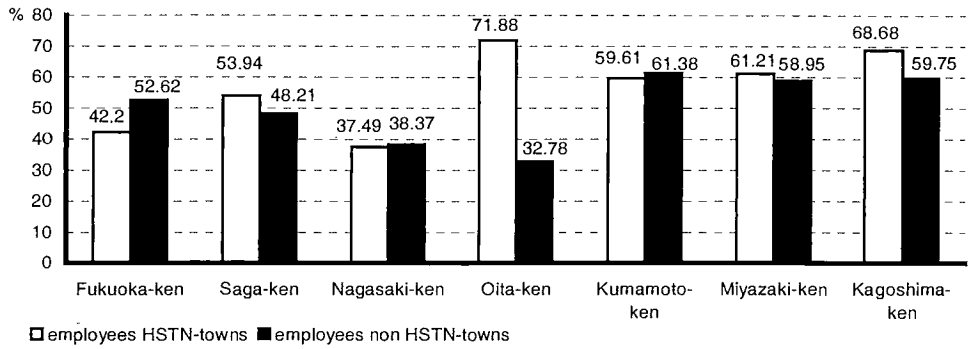

Figure 7 - Growth rate in numbers of employees in towns with direct access to HSTN in comparison to the other prefectural areas in Kyûshû, 1972-1996, in %(Obermauer, 1996; Sômuchô, 1996)

In other prefectures, HSTN-towns usually show a higher growth rate than prefecture areas without direct access. In Nagasaki prefecture and in Kumamoto prefecture, non-HSTN-towns show a slightly higher growth rate than areas with direct access. As for Miyazaki prefecture, the result is similar but growth rate in non-HSTN-areas is still lower than in HSTN-towns, showing that also towns without direct access can offer location advantages for a settlement.

Development valuation in Tôhoku and Kyûshû

As the investigation of towns and areas in Tôhoku and Kyûshû concerning their accessibility to the HSTN has shown, most towns with direct accessibility to HSTN have a positive result for the indicators locations of companies, development in number of inhabitants and development in the number of employees. Generally speaking, the growth rate for areas without accessibility is less high than in case of towns with access to HSTN. However, some regional differences and exceptions have been observed. Compared to the other investigated regions, North-Tôhoku and South-Kyûshû are located in farthest from the national agglomeration zones in Kantô and Kansai. Their demographic development is only positive in the prefecture capitals and a few other HSTN-towns. In South-Tôhoku and North-Kyûshû, located nearer to the national agglomerations, the result is more homogenous for HSTN-towns the closer the prefecture is located to an agglomeration zone. For example in Fukushima prefecture, the growth rate in population is higher in all HSTN-towns than in other areas without direct access. In Fukuoka prefecture the result is similar for most HSTN-towns. Concerning the investigation of the Kyûshû region, it can be stated that the further south a prefecture

is located the less homogenous the result is for HSTN-towns, and the more outstanding the result is for the prefecture capital. In the South-Kyûshû prefectures, the existence of direct access to the HSTN is essential, but can only influence a positive development in the number of inhabitants in towns with a high concentration of economic and administrative functions. For other HSTN-towns as well as for non-HSTN-towns, the accessibility to the transportation network is not sufficient to enforce a positive development of the three investigated indicators. Concerning the location of industries and the development in numbers of employees, towns with direct access to the HSTN are favored locations in almost all prefectures, irrespective of their distance to the agglomeration centers or their function as prefectural capital. A comparison of all HSTN-towns and non-HSTN-towns for each prefecture and each indicator shows for the number of companies and for the development in number of inhabitants, that with the exception of Fukuoka prefecture, HSTN-towns are favored to have a more positive and higher growth than prefecture areas without direct accessibility. This underlines the results of the comparative analyses for towns with and areas without access to the HSTN.

In the case of the development in the number of employees however the result is much less homogenous. In Tôhoku, the prefectures Aomori and Fukushima show a higher increase in the number of employees in non-HSTN-areas. In Kyûshû, Fukuoka prefecture shows a similar result. Concerning Nagasaki and Kumamoto prefecture, the growth rate in the number of employees is nearly the same for areas with and without direct access to HSTN. As for Fukushima prefecture and Fukuoka prefecture, it can be assumed that these results are due to wider spread industrial locations not only near to the HSTN but also in areas with some distance to it. Moreover, there is the effect of economic growth in the whole prefecture and increasing land prices near the HSTN as well as in existing industrial areas near the transportation routes. Focusing on rising land prices, a location in some distance to the existing centers and HSTN could be favored by a company, in the case that the secondary street system is well developed. This is the case for Fukushima prefecture which is located nearest to the Kantô agglomeration compared to the other Tôhoku prefectures. Fukuoka prefecture in northern Kyûshû is a traditional industrial area and economical center with high importance for the whole Kyûshû island. Since there are also some structural changes taking place, it is likely that also new industrial areas are build at some distance from the HSTN, partly also because of lower land prices there. In Aomori prefecture, the result could be influenced by the higher percentage of less HSTN-oriented industries in the first and third sector. The aspect of the accessibility to the HSTN can be a limiting criterium for industrial location in an area but it is definitely not the only important reason for differences in regional economic development. The existence of a HSTN is certainly an element that can influence the economic performance positively if other steps are undertaken to develop the area or if economical functions have been already introduced to an area. But if no other criteria exist in a certain area that could favor a location decision, nor measures for regional economic development to attract companies are taken into consideration, the accessibility of the area to the HSTN will not be sufficient to effect a positive economic or population development.

CONCLUSION

From the standpoint of the question of whether and how the transportation network can influence the industrial location decision, the changes in the number of industrial location, the number of inhabitants and of employees have been analyzed and compared for the Tôhoku and Kyûshû region before and after the opening of highways and Shinkansen-lines. The results show that a positive development in the economic performance of an area can only take place in towns which have various functions as inter-regional centers and in towns with highly developed economic and administrative functions. In case of prefectures in the Tôhoku region, especially in South Tôhoku, the positive influence of the 300 km wide Kantô economic zone was observed that favored an increase in the number of industrial locations. This preference of the region for industrial location was made possible because of the extension of the HSTN. With a connection to the HSTN, one important limitative criterium concerning the decision for location and further increase of relocation

of industries towards peripheral regions can be eliminated, that is the of lack of accessibility. Therefore, a further expansion of highways and Shinkansen lines must be considered as a positive measure to develop and strengthen the economic position of a region. However expansion of the HSTN is liable to be slowed down because of financial problems in particular and because of the difficulties to justify the construction of highways or Shinkansen-lines in regions with a low volume of traffic. However, because of the growing competition with industrial locations overseas, various measures for domestic regional economic development will be necessary, including a further extension of the HSTN to remoter regions. Concerning the outcome of former National Development Plans which never really took the individual needs of peripheral prefectures into consideration, a new planning strategy is needed for a more successful economic development in remoter regions. Furthermore, a clear definition and an equal distribution of responsibility concerning regional development measures between decision makers on the national level and politicians on the prefecture level is needed. Without a higher allocation of decision jurisdiction on the prefectural level, and also the necessary funds for the realization of development projects, an improvement of the economic situation and an increase in the number of industrial locations cannot be expected - even with a further extension of HSTN.

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