A GEOGRAPHICAL STUDY OF THE EMERGENCE OF THE HIGH-SPEED TRAIN AND HIS EFFECTS ON LAND MANAGEMENT AND REGIONAL ECONOMIC DEVELOPMENT IN JAPAN

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ABSTRACT

Basing ourselves on the foundations of transportation geography, we have applied its conceptual framework to land-use planning and to the development of the regional economy. While implementing the work already taken up, the objective of this study was also to analyze in a systematic and quantitative manner the relationship between the actions of the Japanese government and the rapid expansion of the Shinkansen basic network (Tokaido, Sanyo, Tohoku and Joetsu lines). A second objective of this analysis was to examine the role played by the government as a promoting and marketing agent for rail transportation. Very little has been done in the way of studying the effects of Japanese policy on land management and regional economic development with regard to high-speed rail transportation. The present study analyses quantitatively the processes which have contributed to the rapid expansion of the Shinkansen network since its inception in the early 1960s. It concludes that, in districts which had been provided with such an infrastructure with the help of the Japanese government, there was a clear link between this policy, land management and the regional economic development.

KEY WORDS: High-Speed Train, Shinkansen, Japan, Regional Economic Development, Land Management.

CHAPTER 1
INTRODUCTION TO THE GEOGRAPHIC STUDY OF THE HIGH-SPEED TRAIN SHINKANSEN

Because of the emphasise it lays on the study of spatial interrelations between physical, socio-economic and political elements, geography is an ideal tool to study the effects of a government policy on a region. It provides, on theoretical as well as methodological plans, specialized instruments for addressing the research problematics concerning a quantitative analysis of the impact of a transport policy on land-use management and regional economic development.

This study examines not only the evolution of the impact of the Shinkansen (the high-speed train linking the major towns of Japan) on a region, but also its growth in the global context of the development of the Japanese archipelago. It will further the knowledge in the field as well as serve to validate the geographic approach which has been already successfully tested in the context of Québec. Till date, there have been few studies which have examined the Japanese rail network based on a model devised for the study of North American rail.

1.1 REVIEW OF LITERATURE

To validate the foundations of this study it is necessary to review the existing literature and define the scope of the study with regard to the deployment and influence of the Shinkansen on land management and regional economic development in Japan. The objective being to help us base the research on stronger foundations.

Yamada (1976) studied the impact of the Shinkansen on the movement of people over short and medium distances as well as on air transport. In a brief article, he proved with the help of statistics that the high-speed train had a detrimental effect on short-haul commercial aviation. Because of the cut-throat competition posed by the Shinkansen, flights between cities like Tokyo and Nagoya or Osaka and Hiroshima had to be discontinued.

In an article dealing with the impact of the Shinkansen on land management, Plaud (1977) put forth the reasons which prompted the Japanese government to invest in this system. Coupled with a growing population and economy, the authorities wanted to bring about a better balance between the large urban centers promoted by the

Japanese economic boom and the outlying districts threatened by their attraction. Nevertheless, it showed that in reality, the results of this policy were slow in coming.

The author also analyzed the macro-economic impact of the Tokaido Shinkansen and concluded that the regions through which it passed experienced a greater economic growth as compared to those it did not touch. Incidentally, the effects were most strongly felt in the heart of the service industry, which, due mainly to the growth of tourism, benefited the most from the Shinkansen.

In his study of the movement of people in the archipelago, the geographer Han (1983) noted that the introduction of the Shinkansen posed a direct threat to the airplane, especially over medium distances. Between 1963 and 1977, the time frame of his study, the author showed that, over the Tokyo-Osaka line, the high-speed train grew into a tough competitor to the airplane. He also showed that the extension of this high-speed rail network brought about an increase in the travel over longer distances. Though making admirable use of the quantitative method, he neglected looking into the consequences of this increase on the region.

On the other hand, the geographer Konno (1984) undertook the study of the Shinkansen from a societal angle, focusing on the relationship between this train and the Japanese people. In contrast to a country like Italy, the Shinkansen profits from a clientele of diverse social origins, from student to Emperor. This mode of transportation is hugely popular in Japan because it provides fast and direct transit from city-center to city-center.

The researcher showed that for the urban and rural communities situated outside the Tokyo and Osaka conurbations, the Shinkansen was a tool of modernity, despite the fact that the laying of its tracks could inconvenience the abutters. By stimulating the exchange of business information and activity, it brought about sweeping social and economic changes while attracting much-needed investment into regions having a Shinkansen station. Unfortunately, in a major weakness of his work, the author does not prove his points quantitatively.

Hirota and Iwata (1984) analyzed the consequences of the Shinkansen on the reduction in travel times. They showed that the high-speed train brought about an increase in travel between connected towns and thus helped in the social, cultural and economic development of these regions – differences clearly visible between towns which formed part of the network and those that did not.

[1] The following year, Hirota (1985-1) took up again the argument he had presented with his colleague the previous year. In this article, he showed in further detail how the Shinkansen had a positive effect on the secondary and tertiary sectors of the served municipalities, as well as on their population. According to him, regional towns were the chief beneficiaries.

Ino (1986) was interested in the saving in transit-times made possible by the Shinkansen with the inauguration of the Tohoku line linking Tokyo (Ueno station) to Morioka. He showed that the creation of this service made it possible to reduce by half the travel time as compared to conventional trains, thus cutting deep into the airlines' market. As a result, the number of air passengers between the national capital and Sendai, around 1,600 per day in the year of its inauguration, went down to 600 in 1984. Moreover, the coming of the high-speed train also caused an increase in the demand for restaurants and hotels, especially in Sendai. The Shinkansen caused the creation of 24,055 new jobs in the city and injected ¥123,876 billion in the local economy.

An urban development professor, Ohta (1989) investigated the development of regional planning in Japan in relation to the evolution of modes of transportation between the decades 1950 and 1980. From 1969 onwards, the Shinkansen plays a significant role in these documents dealing with the course of the regional land management strategies. It is thus evident that this mode of transportation is a powerful force in the economic development of the archipelago. By allowing a better distribution of populations and activities, which hitherto had a tendency to aggregate around Tokyo, it brought about a bipolar circuit of movement at the cost of a multipolar approach.

Yamanouchi (1992) showed that the Tohoku Shinkansen has had an influence on the growth of the population in the served regions. Towns with a Shinkansen station experienced a higher population growth than those without. Moreover, he also showed that the number of businesses too increased more rapidly in these towns.

Sawada (1995) studied the effects of the high-speed train on regional development along the Tohoku line. He showed that within the regions it serviced, the Shinkansen had: 1) increased the population; 2) reduced the exodus towards Tokyo; 3) promoted new businesses; 4) created new job opportunities; 5) given an impetus to the service sector, the markets and tourism; 6) facilitated cultural and information exchanges between regions; 7) stimulated urban development and land prices.

Sasaki, Ohashi and Ando (1997) investigated the impact of the Shinkansen on regional urban centers. Their aim was to verify whether the high-speed train promoted the spread of human settlements and economic activities. Using an econometric model,

they concluded that the Shinkansen had contributed to some extent in relocating the growth of developed regions towards the hinterland. They also concluded that while the high-speed train by itself could not solve the problem of migration towards the large centers, as it facilitated access to them, it has had a positive impact on the tourism sector in the regions serviced.

Tanaka (1998) suggests that the continued increase in the speed of the Shinkansen lines is an extremely important variable as it reduces transit times. Moreover, he too like the other researchers, concluded that a Shinkansen station contributed greatly to the development of the region.

Though interesting from many angles, the studies published so far by Japanese and foreign geographers have not dealt with in an integral way the development of the Shinkansen. Still, they provide pointers regarding its influence on land-use management and regional development in Japan.

Very few researchers have undertaken a global study of the Shinkansen along the lines of the geographer Aoki (1988) who introduced a geographic and socio-economic approach to the analysis of transportation:

> Studies were directed toward analyzing transport phenomena, especially in current transport problems, in an integrated system with reference to technology, administration and policy, economics, and culture, with their historical development. These studies also aimed to make clear the process of decision-making in transport entreprises and transport policy in Japan (Aoki, 1988: 150).

He proposed a global approach to the geographic study of transportation systems. His model rests on three precepts: 1) the development of any transportation system is bound inextricably to the political and socio-economic environment around it; 2) the system does not evolve in a vacuum, but in mutual interaction with the surrounding components; 3) transportation must not be viewed as an end in itself, but rather as an instrument whose application is subject to environmental considerations.

The positivist approach, brought about by disappointments caused by the methodology of descriptive geography, was criticized by some North American geographers (e.g. Eliot Hurst (1974), Wheeler (1973)) regarding its utility in explaining the causes behind the installation of a transportation network in a region. It was evident that in a number of studies which used an exclusively quantitative approach, the metrology itself drowned out the object of the studies. Though quantitative models which disregard the societal environment allow us to apprehend the development of a

transport system within a region, they overlook completely the human aspect which promoted it in the first place.

Having thus introduced the research problematics and a survey of the literature, we have now the tools to state the objectives which will determine the orientation of this study.

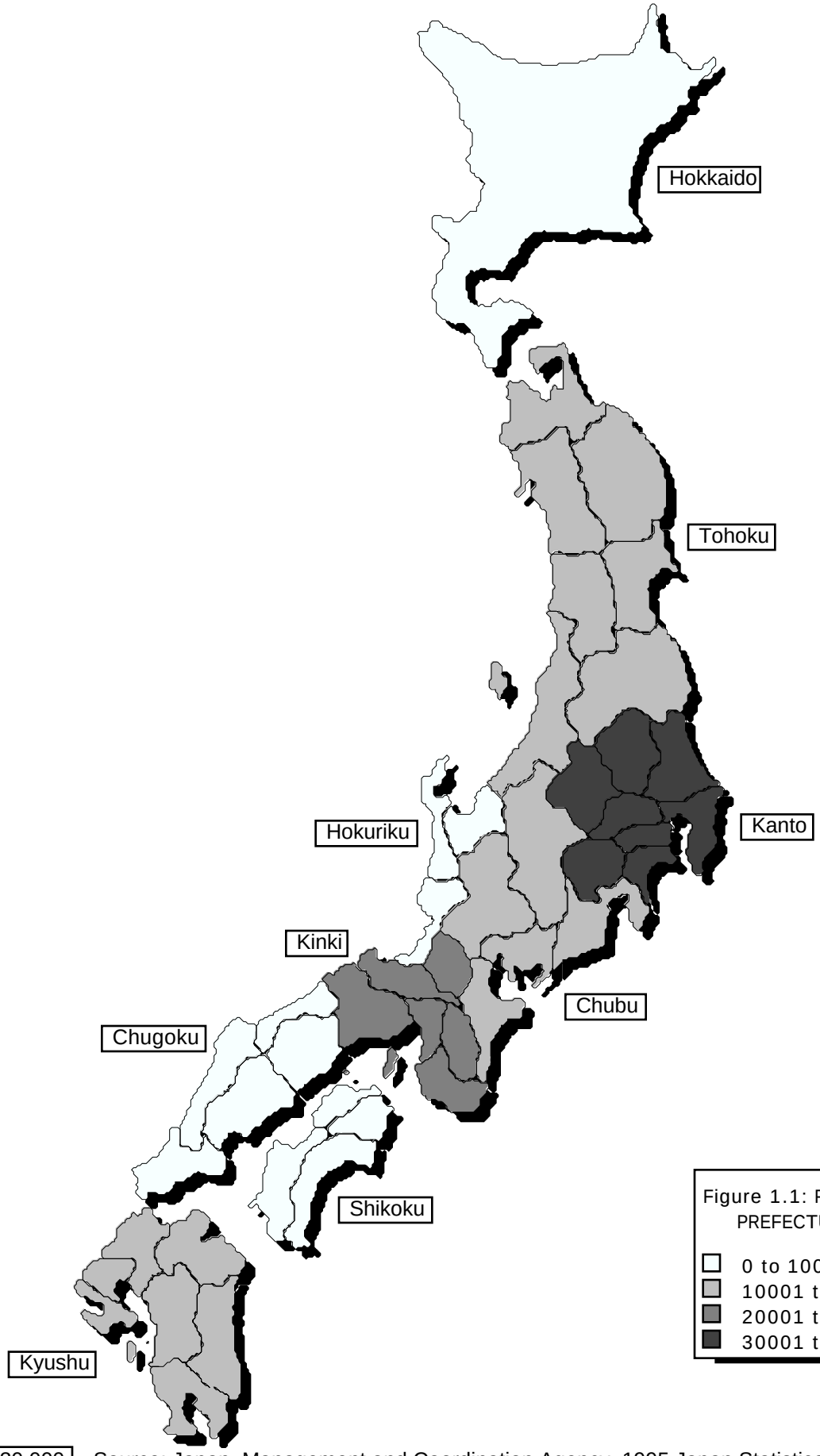
1.2 OBJECTIVES OF THE STUDY

Situated in East Asia, Japan shares its maritime boundaries with China, Korea, the United States and Russia. Most of the population of this nation of 377,819 square kilometers lives on the island of Honshu (Japan. Management and Coordination Agency, 1996: 17) and 66.4% are concentrated in the regions of Chubu, Kanto and Kinki (Tokyo-Osaka megalopolis) which make up only 33.4% of the land area (Figure 1.1). This leaves the rest of the country only moderately populated (Japan. Management and Coordination Agency, 1995: 34-35 and 1996: 17).

As this study concerns itself with the Shinkansen basic network (Tokaido, Sanyo, Tohoku and Joetsu lines), it will deal specifically with the concerned prefectures between 1964 and 1994.

The choice of this period will allow a longitudinal analysis of the influence of the classic Shinkansen lines on the geography of the archipelago during the years of the Japanese economic miracle, which will bring deep changes within the country. It aims at an understanding of the drives which cause changes in Japanese society, such as the arrival of the Shinkansen and the development of land management and regional economic growth. This study proposes to establish links between the physical and human elements in the Japanese context. One of its aims will be to investigate whether, the Japanese government, as in many other countries, has played a predominant role as an agent of intervention, canalization and promotion in the development of the railways as well as in regional land management and development.

Basing ourselves on the foundations of the geography of transportation, we will apply its conceptual framework to land management and regional economic development within the Japanese context. Putting into practice the work begun by some Canadian, Japanese and Québécois geographers (e.g. Aoki, Eliot Hurst and Pouliot), our objective will be to identify and analyze using a systemic approach, the possible effects of the interventions of the Japanese government on the growth of this network.



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Source: Japan. Management and Coordination Agency. 1995 Japan Statistical Yearbook 1996. p. 34-35.

1.3 THEORETICAL FRAMEWORK

Inspired by the theory of systems, the conceptual framework (Figure 1.2) is a representation of interdependent relations comprised between dynamic and complementary dimensions (input, process of transformation, output and results) which help to maintain the system in equilibrium. These dimensions correspond to the following components: societal forces, the government, the government's policy regarding land-use management and regional economic development and the Shinkansen network. All of them form part of the geographic framework called the Japanese State.

At the center of this open system, the government stays in constant touch with the elements which evolve within it, and in the process, feeds itself on input. According to Easton (1966: 7-10), the input are stimuli made up of the demands or support of individuals or groups called, in the context of this research, societal forces. Since the 1960s, professor Easton's model has been used by many geographers who also added a spatial dimension so that it could be applied to their field of study (Dikshit, 2000: 3/33).

The environmental elements (e.g. the policy) have explanatory attributes with regard to the functioning of the governmental system (Simeon, 1976: 567). Though their impact on it is undeniable, they do not justify the orientations it assumes. These elements exist in the environment and remain in a passive state as long as they are not set in motion by societal forces which assimilate, endorse (or reject) and finally turn them into either demands from or backing for the government (Easton, 1965: 27-33). This process aims at harmonizing the system with the situation brought about by its environment. Thus, environmental factors should not be seen as the determining causes of policies, but rather as external elements which influence them.

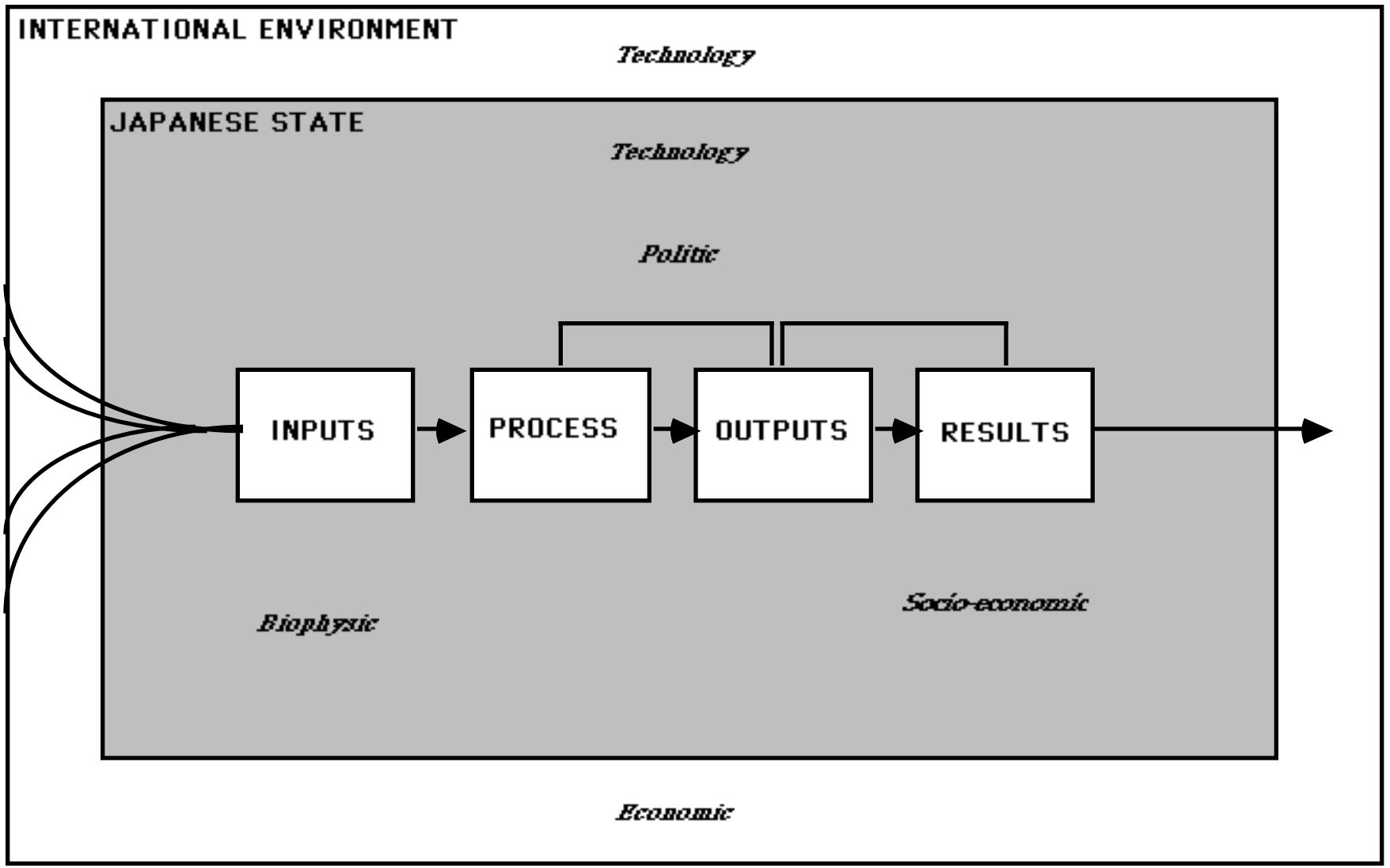
The government, as an agent of transformation, must amend and adopt goals in keeping with the expectations of its people. For that, it has at its disposal political and administrative structures to transform input into output. This process normally gives rise to a policy (Van Loon and Whittington, 1976: 8-10) which, appearing in different forms, is a collection of guidelines aimed at converting demands into results by the means of visible actions.

Being dynamic, this system produces spin-offs which benefit the state as well as the structure which gave rise to it (Bellavance, 1985: 235-236). This feedback provides data which can be used to gauge the progress made towards the pre-fixed goals and check the values which contributed to their birth. Moreover, this process also allows the

system[1] to change and reorient, if need be, the objectives and methods used to attain them.

In the light of this presentation, it would seem that a systemic analysis supports the study of the components and the interrelations suited to the problematics. Each element has a role and field of action within the system, which thereby justifies the mechanisms of this unit.

Figure 1.2: RESEARCH FRAMEWORK



CHAPTER 2
RESEARCH METHODOLOGY

2.1 OPERATIONAL DEFINITIONS OF THE CONCEPTS

The following pages introduce the variables which elaborate on the indicators and contribute to the verification of the hypotheses by the empirical conversion of concepts into operational definitions. This will allow a presentation of the variables working at the heart of the Japanese State and which, subsequently, will be operationalized through the means of the indicators. In order to simplify the text, Table 2.1 shows the variables and the indicators used.

2.1.1 Societal forces

Among the components which influence the Japanese government, lobbies (organizations which structure and canalize societal forces) occupy the first rank in the development of the Shinkansen network. By their proposals and canvassing, they impel the government to act on the landscape of the country.

2.1.2 The Japanese government

This dimension designates the aggregation of the governmental apparatus as well as the decision-making process directing rail operations in Japan.

The variables associated with the indicators allow the quantification of the motor-elements driving the spread of the Shinkansen network, be they associated with societal forces and the government. The variables shed light on the specifics of the source of the message as well as on its recipient.

The adoption of variables common to both societal forces and the Japanese government, yet adapted to the inherent attributes of each, improves the analysis of the documentation. They have been divided into two categories: 1) the distinctives, nominatives and collectives which define the transmitter and receiver of a communication; and 2) the content of the message which allows the representation of its substance.

[2]

Table 2.1
The variables and indicators chosen to verify the hypotheses of the study

Variable	Indicator / Numbering method	Data sources
Hypothesis 1: The government's policy regarding the Shinkansen network is the result of the influences of societal forces acting of the Japanese government.		
Interest representativeness (Inp)	Frequency of the name of an interest group or of a government agency	Japan Times New York Times Times / Sunday Times
Geographic representativeness (Ger)	Frequency of the name of an observed region re-arranged as a function of the Japanese prefectures	Japan Times New York Times Times / Sunday Times
Vested interests (Vei)	Frequency of intrinsic or reported motives as a function of the retained categories	Japan Times New York Times Times / Sunday Times
Operational methods (Opm)	Frequency of operational methods recommended or surveyed as a function of the retained categories	Japan Times New York Times Times / Sunday Times
Orientation of the discourse (Ord)	Frequency of the orientation of the discourse in function of the retained categories	Japan Times New York Times Times / Sunday Times
Hypothesis 2: The Japanese government has an impact on land management and regional economic development by its intervention in the railway sector.		
(Va_1) Variables pertaining to the land management of the region (Circulation)		
Experimental and commercial speed records (Exc)	Number of kilometers per hour	JR Group
Transit times via different modes of transportation (Trt)	Number of hours	JR Group
Travel costs of different modes of transportation (Trc)	Fare in yen (¥)	Japan Airlines JR Group
Departures by modes of transport (Dem)	Number of daily departures	Japan Airlines / JR Group
Availability of seats (Avs)	Number of seats available on a daily basis	All Nippon Airways /Japan Airlines / Japan Air System / JR Group
Passenger volume (Pav_1)	Number of annual passengers	JR Group
Passenger volume (Pav_2)	Number of passengers per kilometer per year	JR Group
Revenues and expenses for the Shinkansen and JR Group (Ree_1)	Operating revenue in yen (¥) per year	JR Group
Revenues and expenses for the Shinkansen and JR Group (Ree_2)	The Shinkansen network's portion in the revenues of JR Group	JR Group
Revenues and expenses for the Shinkansen and JR Group (Ree_3)	Operating ratio per year	JR Group
(Va_2) Variables pertaining to land management (Demography)		
Population of the prefectures serviced by the network (Pop)	Quinquennial growth in percentage	Management and Coordination Agency
Indicator of the migrating population (Inm)	Number of the FREX seasonal card holders	Ministry of Transport
Daily population in the prefectures serviced by the network (Dap)	Growth rate in percentage	Management and Coordination Agency
(Va_3) Variables pertaining to the regional economic development		
Business services industry (Bus)	Growth in percentage	Management and Coordination Agency
Retail plazas (Rep)	Growth in percentage	Ministry of International Trade and Industry

2.1.3 Distinctives, nominatives and collectives

The status of stakeholders which "[…] designates the initial situation of the individual as determined by the culture […] is a consequence of social […] and geographic conditions" (Grawitz, 2001: 507). The choice of significant variables such as the representativeness of interest and of geography, permit the codification of the characteristics of the major players in the growth of the Shinkansen. Consequently, all elements which induce isolated or collective action are measured with the help of these variables.

2.1.4 The representativeness of interest

Among the variables likely to effect the network, some researchers like Edwards and Sharkansky (1978) and Quesnel-Ouellet and Bouchard (1979), have often recognized nominative criteria such as the representativeness of interest which refer to the group to which the transmitter of the message is associated as trigger-element acting upon the public decision-makers. It enables the identification of the groups which hold powers of delegation and intervention within the governmental apparatus.

The representativeness of interest is expressed via a single indicator: the frequency of occurrence.

$$\mathbf{f_y = \sum a}$$

where: f_y= Annual frequency
a = Article

2.1.4.1 Societal forces: Indicators

This variable helps classify non-governmental organizations which address the Shinkansen network or canvass in its favor.

The number of occurrences by the group types which constitute societal forces could serve as an indicator. The use of this measure is based on the hypothesis that more an element is significant, greater will be its frequency of occurrence in the units of physical analysis studied. (De Bonville, 1988: 8-11).

2.1.4.2 Forces intrinsic to the government: Indicators

The representativeness of interest of the forces working within the political institutions and the public administration can be established as a function of the

frequency[2] of occurrence of the name of the organization and the related motion of intervention. Such a classification will help segregate the stakeholders within the government who influence, promote and manage the Shinkansen network.

2.1.4.3 Geographic representativeness

This variable deals with the demarcation of the geographic environment of the transmitter, that is to say, to highlight the locale which is the focus of his discourse.

2.1.4.5 Contents of the geographic and socio-economic messages

These variables help to define the aims as well as the proposed methods in order to materialze the network.

A variable can indicate the motives, either invested or identified, in the Shinkansen network and thus help in the attainment of certain geographic and socio-economic objectives. In the context of this study, we must understand the motives which stimulate a transmitter in his promotion of this railway. The motives attributed to this mode of transportation may be divided into three overlapping categories:

1) LAND MANAGEMENT
   a) Creation of urban centers
   b) Creation of commercial (and tourist) centers
   c) Creation of manufacturing centers
   d) Increased mobility of goods
   e) Increased mobility of citizens
   f) Protecting the environment
   g) Reducing the urban congestion

2) REGIONAL ECONOMIC DEVELOPMENT
   a) Means for creating jobs
   b) Means for commercial (and tourist) development
   c) Means for manufacturing development
   d) Means for improving the citizen's quality of life
   e) Means for increasing intermodal competition
   f) Means for reducing energy imported from foreign countries

3) SOCIO-ECONOMIC ASPECTS
   a) Reliability of the network
   b) Electioneering
   c) Economic nationalism
   d) Diversification of the commercial activities of the JR Group (JNR)
   e) Construction or expansion of the network
   f) Technological model to be emulated
   g) Export of the Shinkansen know-how
   h) Modernization / Research and Development (R&D)

[2] The recommended or surveyed operational means used in the application of these objectives constitutes by itself another variable of this dimension. It permits the study of different intervention methods which the transmitters suggest to the government for ensuring the implementation of the network. To repeat, it is the frequency which allows it to be quantified.

Finally, we must pause to consider the direction of the treatise regarding the Shinkansen network. It will be validated by the means of the three categories: 1) favorable; 2) unfavorable; and 3) neutral.

By means of these questions, the motives which led to the particular or general development of the agents will help validate the hypotheses of the research. In the context of this analysis, all the associated variables have as aim to bring out the intrusions and the bearing of the forces regarding the Shinkansen network in its function as a tool of land-use management and of regional economic development.

2.1.5 Land-use management and the regional economic growth

As yet, the elements introduced have contributed to the organization of the framework for the analysis of the process preceding the development of the network.

The study of this dimension will aid the geographic analysis of the consequences of Japanese intervention in this sector by the means of the impact of indicators on the elements which gauge the efficiency of the Shinkansen. At the same time, the superimposition of the aims of the network on the consequences to the region will serve to verify whether these goals were justified and generated side benefits for the region. Similarly, unexpected results (good or bad) could also be added to those anticipated by the planners. That is why they need to be quantified in order to arrive at a global representation of the efficiency of the network.

To measure the effects of the Shinkansen network on the landscape and overland activity, certain variables were chosen to conduct an empirical analysis. Table 2.1 brings together these variables as well as a summary of their associated indicators. These indicators were chosen because they were objective and reliable measures of the variables and because of their adaptability to different areas of rail transportation.

2.1.6 Land management

With regard to the regional economic growth, land management consists in increasing the value of, or in organizing through work and asset building, an area with a

view[2] to its development. It results from a human action whose ulterior aim is to help in the optimal distribution socio-economic activities in a region in accordance to the provisions laid on this region. This development is aided by the allocation of labor and equipment to this region. Thus, this process can bring about economic changes by the laying of transportation infrastructure which could modify, restructure or adapt itself to the inherent activities of a geographic locale.

Two multivariate groups comprising of the variables of land management are associated with the study of the network: circulation and demography. Once this is done, most of the collocated data would be operationalized geographically. The spatial association of the program will serve to verify if there exists a geographical link of causality between the output from the Shinkansen network and land management and regional economic growth.

2.1.7 The regional economic growth

The regional economic growth can be concretely defined as a group of mechanisms stemming from the actions of intra or extra-territorial agents (e.g. political, economic) which result in the socio-economic growth of the region.

The variables chosen to quantify regional economic development have as fundamental aim to verify the effect of the Shinkansen network on certain aspects of the regional economy of Japan.

This dimension will be analyzed by basing ourselves on the growth of the establishments of the service industry whose two variables have been placed within the multivariate group: enterprises (Table 2.1). These indicators possess similar characteristics, and thus may be compared one with the other, notwithstanding inter- and intra-regional differences.

2.2 RESEARCH HYPOTHESES

The catalyst at the heart of the network, is the Japanese government which receives the demands arising from societal forces. The model concretizes the relations between the input (entrypoint for the environmental elements into the system) and the transforming agent (the government) to bring about an output (the Shinkansen) which results in specific outcomes (land-use management and regional economic development) which are retroactive on the exogenous environment (Japan).

[2] The basic statements contained in the reflexions set forth by the geographer Marcel Pouliot (1980) are very interesting. Using a global approach, he has shown clearly the instrumental role of transportation in the governmental apparatus. As his propositions make up a sound basis and are applicable to the development of transportation in Japan, they have been used as conductor wires for the elaboration of this problematic.

This study can also serve to verify one of Pouliot's hypothesis. For the purpose of checking one of his assumptions, and knowing that transportation is an instrument which allows a State (according to Pouliot, in our case the government) to develop its territory, we have the following general hypothesis adapted from professor Pouliot:

H_g: the aim of transportation is to help the State exercise its authority in the field of land management and regional economic development.

To this general hypothesis are added two working hypotheses. Based on the dimensions used, they help in the study of the synergy leading to the production of output.

H_1: the governmental policy regarding the Shinkansen network is a reflection of the influences of societal forces acting on the Japanese government.

The demands of the societal forces tally with the network adopted and applied by the Japanese politico-administrative apparatus. According to this hypothesis, these movements are the source of the government's chosen orientation in this sector. The variables related to the meaning and content of communications between the societal forces and the Japanese government establish a correlation between these two dimensions.

The hypothesis associated with this relation aims at establishing a connection between the motives behind societal forces, the contents of their message and their potential influences on the government in the framework of its network. In this context, variables like the representativeness of interest, geographic representativeness and the content of the message are characteristics which shape the output and the results expected by the system.

Some geographers have adopted criteria arising from societal groups to explain the development of a spatial network like rail transport. Leung (1980) succeeded in establishing the correlation between the growth of the Chinese rail network and the

adoption[2] of the communist ideology by the Chinese government with the advent of Mao Zedong (1893-1976) in 1949.

Keeping in mind Eliot Hurst's statement (1974: 2) that the decision-making process in matters of transportation is subjected legitimately to societal forces and that there have been few geographers who have studied the link between these forces and effects on the landscape, we will retain the hypothesis $\mathbf{H_1}$.

One of the aspects of this systemic analysis is the integration of the intergovernmental decision-making process which results in the network. This process aims at identifying the fundamental connections behind the origins and final shape of the railway policy. Accordingly, we have hypothesis $\mathbf{H_2}$:

> **H_2**: the Japanese government, by its intervention in the rail transportation sector, contributes to land management and the regional economic development.

This second hypothesis states that by the means of its interventions in the railway system, the government contributes to the economic and geographic development within the sphere of its influence. It allows us to verify whether it is effective and helps change the Japanese landscape.

This hypothesis is fundamentally geographic as it seeks to provide a detailed synthesis of the effects on the landscape generated by its interventions in this sector. It emphasizes the connections between the network, land-use management and the regional economic development. It opens the way to a quantitative analysis of the government's rail activities which, because of their geographic nature, shape the Japanese landscape.

This hypothesis is based on the theory highlighted by the geographer Wolfe (1962: 176) that transportation as a political instrument plays a role in the creation, consolidation and growth of all countries. It will enable us to know whether the rail activities financed by the public sector have contributed to land-use management and the regional economic development.

We have convert in a mathematical formula the hypotheses, in accordance with the variables of Table 2.1:

$$\mathbf{H_g = H_1}\ (Inp+Ger+Vei+Opm+Ord)$$
$$+\ \mathbf{H_2}\ (\mathbf{Va_1}\ (Exc+Trt+Trc+Dem+Avs+Pav_1+Pav_2+Ree_1+Ree_2+Ree_3))$$
$$+\ (\mathbf{Va_2}\ (Pop+Inm+Dap))\ +\ (\mathbf{Va_3}\ (Bus+Rep))$$

2.3 COLLECTION AND ANALYSIS OF DATA

The collection of data consists in bringing together pertinent and recordable information. This process entails a verification of research hypotheses whose validity depends on the availability and designation of the information bases used. Subsequently, the result of this classification will be manipulated using techniques which lead to an interpretation of the hypotheses.

Without written sources, this study would be laborious, if not impossible. These documents shed light on the motives which brought about a change in Japanese land management.

2.3.1 Analysis of newspaper articles

A quantitative study of the societal and governmental forces was undertaken by the means of three newspapers: the *Japan Times* (Tokyo), the *New York Times* (New York) and the *Times / Sunday Times* (London). All articles relating to the Shinkansen appearing within two time frames were retained: from 1 January 1938 to 31 December 1943 and from 1 January 1956 to 31 December 1994. The first period corresponds to the time when the Japanese government officially mooted the idea of developing a high-speed train, while the second spans the phase of the implementation of the network as we know it today.

These newspapers were selected based on three criteria. First, because they are known as agents of responsible journalism, second, because they existed throughout the study period and third, because each was indexed and allowed a search based on the three keywords: Japan National Railways (JR Group), Shinkansen and Railway (railroad). It must be noted that the index of the *Japan Times* was incomplete prior to October 1987 as it only referred to editorials and articles of major interest. Moreover, prior to November 1961, there was no way to locate the information quickly. Fortunately, three chronological tables published in books dealing with the history of the Shinkansen and the Japanese National Railways (JR Group) provided references to articles with relation to important dates (Japan. Japanese National Railways, 1975: 777-788, Harada, 1986: 400-417 and Harada, 1988: 415-436).

As for the governmental agencies, the study is limited by the availability of documents published in either English or French. Which explains why they have not been subjected to a formal analysis of content. However, the primary documentation

required[2] for this study (e.g. land management plans) were available in English. At times, publications in Japanese have also been referred to.

The analysis of content "[...] is a research technique for the objective, systematic, and quantitative description of the manifest content of communication" sent by individuals or groups (Berelson, 1952: 18). By studying literary documents using techniques which allow a quantitative approach to qualitative data, it brings human phenomena within the pale of scientific research.

Anyone who tries a content analysis is bound to come across the elements in Berelson's definition. He would have to use means both reliable and objective so that the results remain independent of the observer and comparable across studies. This requires a clear definition of categories and units as well as normalizing of the metrologic criteria.

The analysis of content in this study was done by a single individual, the author. This minimized errors of interpretation as the criteria themselves were also defined by him.

Secondly, every analysis must be systematic. The whole data set was divided into one of the above-mentioned exhaustive and mutually exclusive categories with the help of the measuring instrument, that is to say, the content analysis coding sheet (Appendix 1). In this manner, every information element will be either included or excluded while the recording units remain exclusive. The aim is to eliminate, by getting rid of all bias "[…] any arbitrary selection which retains only those elements which are in accord with the researcher's thesis" (Kientz, 1971: 150).

The third element is quantification. While the information studied is qualitative, the analysis must transform it into quantitative data. The most conventional method is to measure the frequency of a data element. This method, which stresses the repetitiveness of words or phrases as a verification of an hypothesis was strongly advocated by Berelson.

Finally, the researcher must restrict himself to the specific content of the messages without inferring anything on the probable intention of the author. This will minimize any bias stemming from his preconceived ideas. According to Kientz (1971), the analysis of content must concern itself only "[…] with that which has been specifically expressed and not on a presumed interpretation based on what we know or think we know of the psychology and intentions of the author-transmitters".

[2] If the categories are precise and the encoding forms use closed choices, the analysis will restrict itself to the specifics of the message and avoid undesired results.

In the light of the above, it is evident that the analysis of content is a reliable and objective technique which can help to wade through large amounts of literary data without great expense of time or money.

2.3.2 Analysis of spatial and socio-economic influence

The hypotheses of the study were backed by statistics based on socio-economic data furnished by Japanese organizations like the JR Group, the administrative coordination and management agency, the transport ministry as well as the ministry of international commerce and industry (Table 2.1).

For more reliable conclusions regarding the influence of the Shinkansen on land management and the regional economic development, the information was gathered from wide-ranging sources. Fifteen variables have been chosen, ranging from those linked to land management to those concerned with effects of the high-speed train on regional economic development.

2.3.3 Mapping of data

To make sense of the frequencies and percentages resulting from the analysis of the data, wherever possible, the figures will be shown in the form of charts.

In most cases, the statistics will pertain to two spatial units, the prefectures of Japan and the cities served by a Shinkansen train station (Appendix 2). To finish, relevant charts will illustrate and complete the information introduced in the text.

CHAPTER 3

THE GEOGRAPHIC, ECONOMIC AND POLITICAL BASES OF THE SHINKANSEN HIGH-SPEED TRAIN

In the 1950s, the Japanese government embarked upon numerous, large social projects to help its populace which had been severely affected by World War II (1939-1945). Its first aim was to rebuild the national economy. Once that was done, it introduced initiatives which would aid in the economic growth, optimal land management and social development of the country. The Shinkansen rail network was one of these initiatives.

The major political figures thought of turning Japan into a dynamic and prosperous nation by giving it the societal framework required for this ambitious societal enterprise. A project which aimed at nothing less than to firmly establish Japan among the great industrialized nations of the world. In continuation of the major reforms begun during the Meiji Restoration (1868-1912), the country gave itself a political administration which was moved by a strong national spirit and the will to become the engine of economic and collective growth.

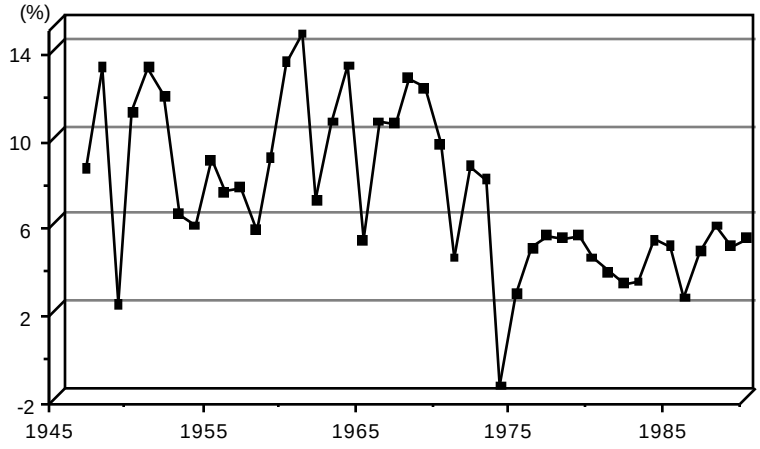
The most visible and symbolic results of these changes were seen in the political and economic domains. In the latter case, the development of the nation was supported by the establishment of a solid industrial infrastructure based mainly on the production of goods with national as well as international markets (e.g. cars). The Japanese State helped bring about favorable conditions for the economic growth of the nation by the means of its institutions: the Economic Planning Agency, the Ministry of International Trade and Industry, public corporations and their legislative and financial arms.

The Korean war (1950-1953) gave the national economy another boost. At about the same time, there arose a big demand, from within as well as from outside, for consumer and manufactured goods. These conspired to inject new life into the Japanese economy which henceforth experienced phenomenal growth rates almost every year till 1974 (Figure 3.1).

A series of governmental measures were implemented from the 1950s. State planning played a key role in the new dynamism. In contrast to the gigantic plans of

socialist countries, Japanese planning was extremely flexible and did not depend on the attainment of fixed goals at all costs. Instead, it consisted of general guidelines aimed at the betterment of the country. In harmony with the societal forces of the nation, wherein business played a cardinal role, these plans were generally devised for a period of 4 to 5 years.

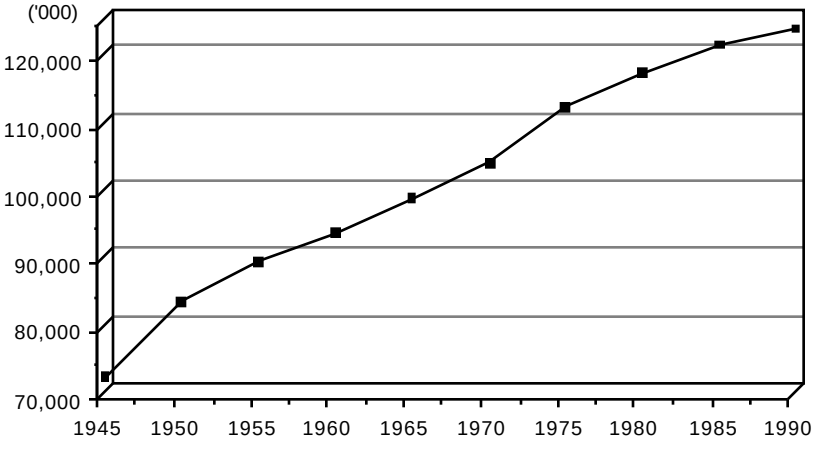
Figure 3.1: REAL GROSS NATIONAL PRODUCT GROWTH, 1947-1990



Sources: JAPAN STATISTICS ASSOCIATION (1987) Historical Statistics of Japan, volume 3. p. 409.
JAPAN. Economic Planning Agency (1990) Annual Report on Business Cycle Indicators. p. 4.

The first plans were directed towards three major objectives: autonomy, economic growth and eradication of unemployment. From the 1960s, a growing emphasis was placed on the establishment of conditions which would lead to a healthy Japanese contribution to the international community and to better living standards for its people. Henceforth, the government would advocate a lasting economic development which leads naturally to an improvement in the living standard of the average Japanese.

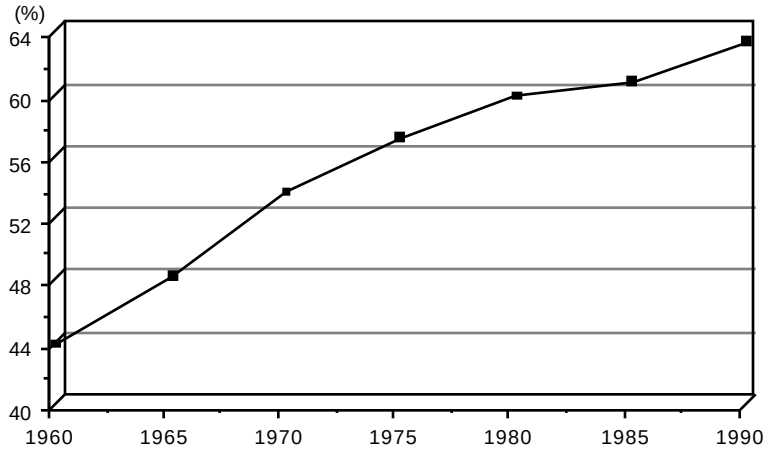
Figure 3.2: POPULATION GROWTH (JAPAN), 1945-1990



Sources: JAPAN STATISTICS ASSOCIATION (1987) Historical Statistics of Japan, volume 1. p. 49.
JAPAN. Management and Coordination Agency (1991) Japan Statistical Yearbook 1991. p. 25.

[2] These new orientations were as important and necessary as the construction of new infrastructure (e.g. railways) necessitated by the growing population (Figure 3.2), the rapid urbanization of Japan (Figure 3.3) and the concentration of people and major business activities in the Tokyo-Osaka megalopolis. These new investments were canalized not only towards them, but also towards peripheral regions due to a political will which sought to dilute the economic and urban growth of the Tokaido super-agglomeration and redirect it towards the rural districts. Concurrently with this reorientation, people began to grow aware of the socio-economic and environmental problems brought on by the Japanese economic boom.

Figure 3.3: DENSITY OF POPULATION OF DENSELY INHABITED DISTRICTS, 1960-1990



Source: JAPAN. Management and Coordination Agency (1992) Japan Statistical Yearbook 1992. p. 30.

Due to both international and national causes, the Japanese economic growth began to lose steam in the 1970s. This downturn was hastened by the energy crisis of 1973, when the Organization of the Petroleum Exporting Countries (OPEC) hiked oil prices. This decision, which had far-reaching consequences on the global economy, had a serious impact on Japan which depended almost entirely on imported oil for its energy requirements. In 1974, for the first time since the end of the War, the Gross National Product would experience negative growth (-1.5%). Though this temporary decline in no way signified an irreversible fall, the figures achieved in the preceding years were now a thing of the past. Having matured by now, the Japanese economy did continue to progress, but much more slowly than it did in the good old days (Figure 3.1).

At the same time, the Japanese government, worried about reducing its budget deficit, began in the early 1980s, to study the possibility of privatizing some state corporations. In 1987, the two principal public enterprises in the transportation sector, the Japanese National Railways (JNR) and Japan Airlines were thus privatized. These

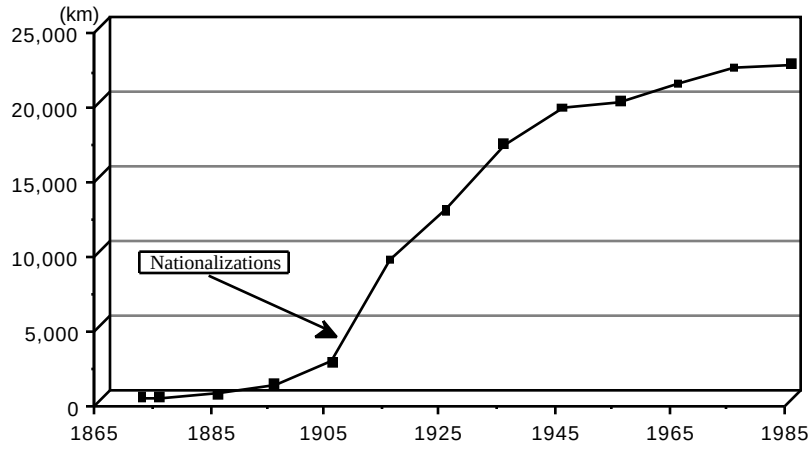
necessary steps did not affect State plans as the government retained privileged ties with the privatized enterprises.[2]

3.1 THE BIRTH OF THE JAPANESE RAILWAY

In keeping with the country which adopted it, Japanese rail has a rich history. Though it began with the laying of a few kilometers of rail tracks which sometimes served only for the admiration of the passing landscape, or to satisfy members of Parliament, or even, as some geographers have pointed out, to ferry school children (Aoki, 1988: 153), it still remains a fact that this mode of transport has contributed in no small measure to the economic development of the nation. It is a literal as well as symbolic reflection of the process of modernization begun towards the end of the 19th century. The first railway line was opened on 14 October 1872. Twenty-nine kilometers long, it linked Shimbashi (Tokyo) to the port-city of Yokohama (Kanagawa).

In the 19th Century, railways were the instrument of progress which boosted as well as empowered the countries which adopted them. They had symbolized success and economic resurgence in the European and North American countries and could not but entail similar results here. Paving the way to the creation of a prosperous nation, they would form the integrating link between the hinterland and the sea-ports (e.g. Yokohama) which had already become major centers of world economy.

Figure 3.4: LENGTH OF GOVERNMENTAL RAILWAYS, 1872-1985



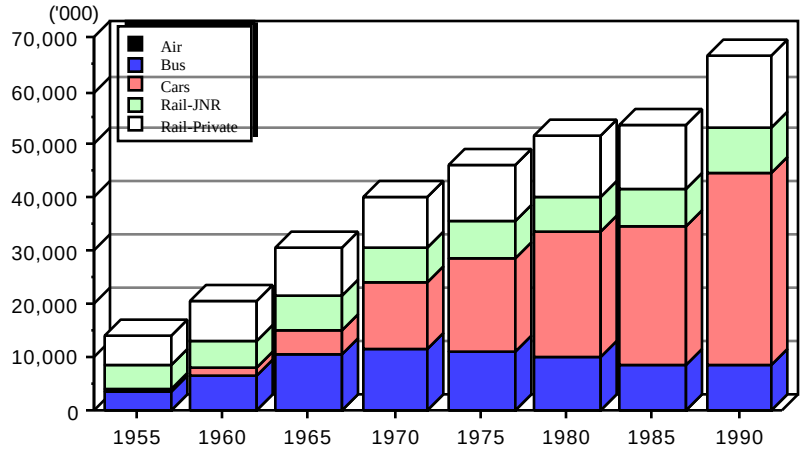
Sources: JAPAN STATISTICS ASSOCIATION (1987) Historical Statistics of Japan, volume 2. pp. 506-507.
JAPAN. Management and Coordination Agency (1987) Japan Statistical Yearbook 1987. p. 306.

Till 1945, the railways also contributed to the war effort as a logistic tool for the geopolitical and military expansion of Japan. This period saw a rapid growth of governmental railways. In 1906, the nationalization of a number of private railways

allowed[2] the government to use public funds to lay new lines, though, as it often happened in the hinterland, it was more for electoral reasons (Taniuchi, 1984: 118). This rapid growth was also the result of a will to support the development of the military-industrial complex which was then in full force (Figure 3.4).

In its wars against China (end of 19th century) and Russia (mid 1900s), Japanese railways contributed greatly to the success of its armies (Harada, 1980: 319). They were also used by the military during the colonization of Manchuria and in the second Sino-Japanese war which began in 1937. In fact, it was to support such expansionist policies that the Shinkansen network was proposed and initiated at first.

Figure 3.5: PASSENGERS BY MODE OF TRANSPORT, 1955-1990



Source: JAPAN. Management and Coordination Agency (1992) Japan Statistical Yearbook 1992. p. 304.

From the few kilometers it spanned in 1872, the Japanese rail network today covers the nation's entire land area, except the prefecture of Okinawa. After years of rapid expansion which peaked towards the end of World War II, the growth of the network stabilized during the 1950s. The advent of other means of transport, such as the automobile, significantly affected the popularity of the railways (Figure 3.5). Nevertheless, the introduction of the Shinkansen in October 1964, revitalized rail travel and proved to the whole world that this mode of transport was in no way outdated.

3.2 HISTORY OF THE DEVELOPMENT OF THE SHINKANSEN NETWORK

By the end of the 1950s, it was evident that the Tokaido line would soon reach saturation point mainly due to the growth in population and business activities. This was reason enough for the creation of the Shinkansen. As part of the nation building drive, this next generation mode of transport became one of the icons which showed to

the world[2] that Japan could become an industrial power based on its technological innovations and the ability to produce high-quality goods.

In May 1956, the Japanese National Railways formed an Inquiry Committee for the improvement of the Tokaido line. It was to study the needs of the country as well as investigate technological solutions which would solve the problem of increased rail traffic. In the following months, the idea of creating the Shinkansen network was given a more serious thought by both the government and business enterprises. For over a year, it was the dream of engineers and the directors of the public sector.

In May 1957, the Railway Technical Research Institute organized a conference on high-speed trains. This gave the engineers the opportunity to show to the Japanese people the technical feasibility of a system which could link Tokyo to Osaka in 3 hours with trains plying at 200 km/h (Japan Times, 27 May 1957: 3).

Two months later, the Inquiry Committee for the improvement of the Tokaido line published its report. There was no more a question of justifying an increase in the capacity of the existing infrastructure – it was an absolute necessity for the economic development of the country. Faced with the eternal problem of the gauge, two options were studied. The first was based on existing technology and required the laying of a double line in metric gauge. The second would cost less and be more efficient, but it would mean a revolutionary change for the public sector as it meant laying new lines in standard gauge. Having thus defined the needs as well as the possible technical solutions, the Committee asked the government to consider its recommendations and take the final decision regarding the type of infrastructure to be built (Nishida, 1980: 289-290).

Responding to the public demand by Shinji Sogo (1884-1981), president of the JNR and father of the Shinkansen, the Minister of Transport announced in August 1957, the formation of an Inquiry Committee on the principal line. It would study the two options presented by the National Railways to relieve the congestion in this section: either to construct a new principal line or to increase the present capacity of the Tokaido. It was required to submit an answer based on economic and technical factors. From its work there gradually emerged the technical profile of the Shinkansen network.

The final report was tabled on 9 July 1958. It was suggested that the government and the public sector finance a high-speed rail line to cope with the growing traffic in the megalopolis. Based on the recommendations formulated before the War, it was decided that the train would be driven by electricity and run on normal gauge over a

network[2] without obstacles (e.g. railway crossings) to minimize risks of accidents which would prove catastrophic for such a train. Being at the cutting edge of technology by making extensive use of computers, to the passenger, the Shinkansen would seem closer to the airplane than to any conventional train.

On 20 April 1959, an official ceremony at the entrance of the Tanna tunnel (Shizuoka) marked the beginning of the work which would culminate in what was popularly called the *Dream Super Express*. It was attended by politicians as well as directors of the public sector.

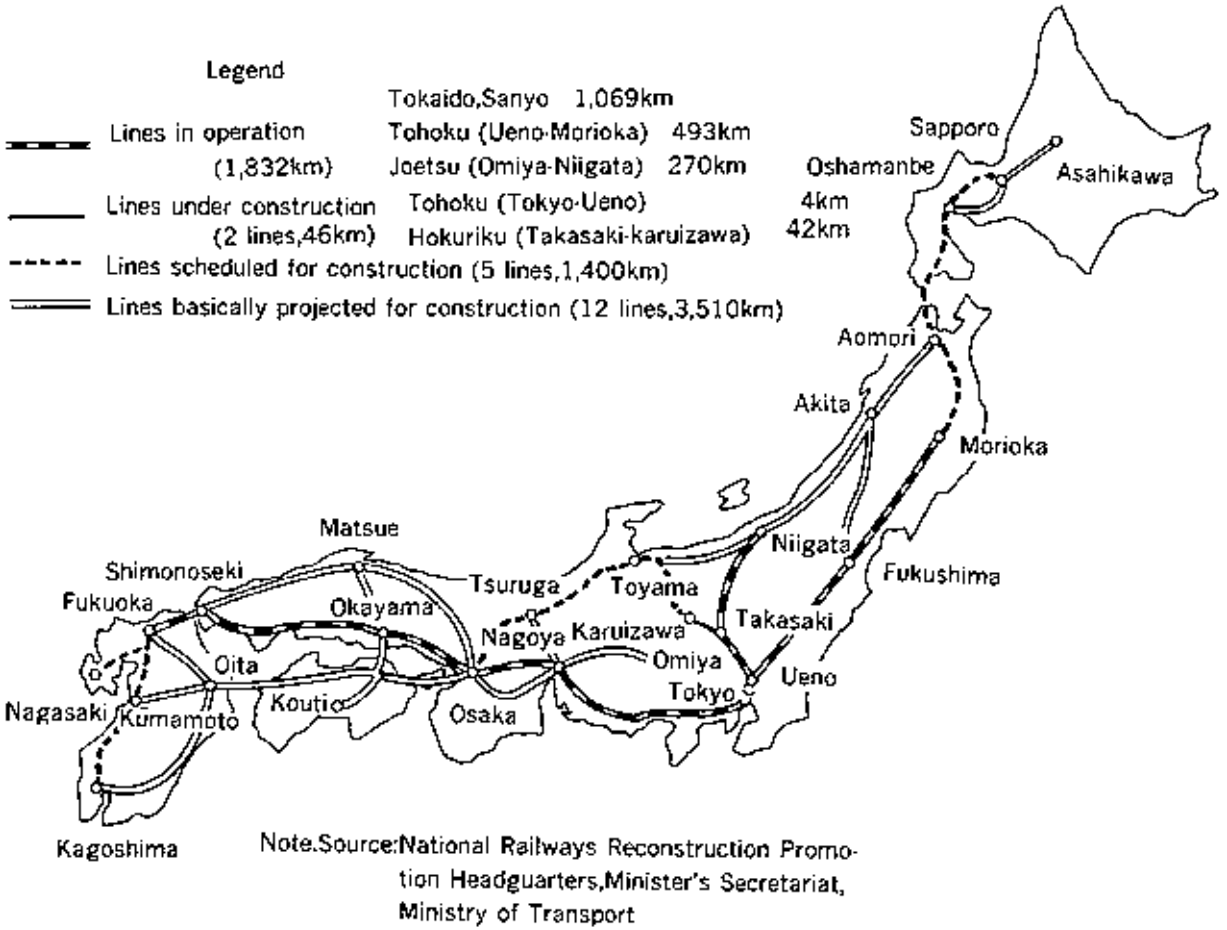
For the next five and a half years, thousands of workers and businesses combined their effort to ensure that the high-speed train would be in service for the Tokyo Olympic Games. In the summer of 1962, trial runs of the Shinkansen began on a 32 kilometer section in Kanagawa prefecture (Ayase-Odawara). Commercial service between Tokyo and Osaka was inaugurated by Emperor Showa (1901-1989) on 1 October 1964, ten days before the opening of the Olympics (Figure 3.6). Spanning 515.4 km between its terminal points, the network consisted of 12 stations, 3,500 bridges (56 km) and 67 tunnels (68 km) (United Nations, 1964: 16).

3.3 THE GROWTH OF THE SHINKANSEN NETWORK

In the following years, the network proved itself to be hugely popular with Japanese as well as foreign passengers. Eleven million used it in the first three months alone. On 19 March 1965, a plan to extend it towards Fukuoka (Fukuoka) was unveiled by JNR (Japan Times, 20 March 1965: 4). A few months later, the National Railways and the Ministry of Transport announced the construction of the first section of the Sanyo line between Osaka and Okayama (Okayama) (Japan Times, 17 November 1966: 3). Work began on 16 March 1967. Ministerial approval for the second section (Okayama-Fukuoka) was obtained on 12 September 1969 and work began in February 1970 (Japan Times, 13 September 1969: 3). Commercial operations to Okayama began on 15 March 1972 and to Fukuoka on 10 March 1975.

In a meeting of the research committee on governmental urban policies in the summer of 1967, JNR presented a long term, ambitious plan for the network which included the laying of 4,000 km of railway lines (Japan Times, 1 September 1967: 4). In May 1969, taking into account the geographic and political reality of the archipelago, the Cabinet approved of this extension and increased it to cover 7,200 km. Four months later, the Liberal Democratic Party's Inquiry Committee regarding the National Railways projected the construction of 9,000 km.

Figure 3.6: Shinkansen network



Source: JAPAN. Ministry of Transport. 1991 Annual Report on the Transport Economy. Summary. (Fiscal 1990). p. 12.

[2]Anxious to officialize and enforce this plan and basing itself on the recommendations of the government's Research Council on the National Railways the Diet voted into existence in May 1970, the *Nationwide Shinkansen Railway Development Law* which envisaged a pan-Japan Shinkansen network totaling 9,000 km (Figure 3.6). It aimed at formalizing and satisfying the demands issuing from rural societal forces without having to construct short term sections. Between January 1971 and November 1973, three plans were adopted within the framework of this law which governed the future development of the entire network.

As the network presently included several unprofitable sectors, the bosses of the National Railways were not particularly happy about this Pandora's box which had been dropped in their lap. Anticipating the apprehensions of the public corporation and with a view to save it the expenses inherent in the construction of new lines, they passed it on to the Japan Railway Construction Public Corporation (JRCC). This would allow the elected representatives to continue to sprinkle the region with segments of the network in exchange for electoral support. Nevertheless, this alternative did nothing to reduce the deficit incurred by the public undertaking, in fact, it was to the contrary, as it would be left with the management of unprofitable lines.

In January 1971, the Ministry of Transport's Advisory Board on the Construction of Railways recommended the extension of the network despite the financial position of the public corporation which had begun to make newspaper headlines. According to the *Nationwide Shinkansen Railway Development Law* these new segments would improve its profitability. A budget of ¥7.5 billion was forecast to conduct feasibility studies of the Joetsu, Tohoku and Narita lines. Construction of the Hokuriku and Kyushu lines was also on the drawing board (Figure 3.6).

Ministerial approval for the plan regarding the first three lines came through on 18 January. On 1 April the minister asked the two public corporations to begin the technology studies. Work on the Joetsu and Tohoku lines began on 28 November 1971.

Commercial service between the capital and Morioka began on 15 November 1982, a few months after the inauguration of the Niigata (Niigata) sector (23 June).

Nevertheless, the second plan regarding the Hokuriku and Kyushu lines and the extension towards Sapporo (Hokkaido) from Tohoku was approved in June 1972. In November 1973, this first step was followed by the authorization to begin the preparatory work for the construction of these lines. Thus began a series of studies conducted jointly by the Council, the National Railways and the Japan Railway

Construction[2] Public Corporation which were then submitted to the concerned minister for a considered decision.

On 2 November 1973, in the midst of this period of rapid expansion, the ministry unveiled an additional plan for the construction of 12 more Shinkansen lines totaling 3,510 km to be completed in 1985 (Japan Times, 3 November 1973: 3). Based on the electoral platform of Prime Minister (1972-1974) Kakuei Tanaka (1918-1993), the extension of the network into the hinterland would reorganize the demographic and spatial map of the archipelago by the decongestion of industrial agglomerations and regional social investment. Unfortunately, the energy crisis of 1973 intervened. In a bid to minimize the negative effects of this event on the national economy, the cabinet ordered a reduction in public expenses. The result was a moratorium on the construction of new lines.

In April 1977, the subject was reintroduced into the agenda. With the elections for the Japanese House of Councilors just round the corner, the government announced that a feasibility study would be conducted regarding the extension of the Tohoku line towards Sapporo and the construction of the Kyushu and Hokuriku sectors, adding up to 1,659 km of new lines (Figure 3.6). Based on the plan made in 1972, this proposal would revive the economy and give the liberal democratic party a means of satisfying public demand (*Japan Times*, 13 April 1977: 2). In spite of being opposed by the Finance and Home Affairs Ministries, it was passed on 3 October 1978. The Finance Ministry found it to be too large a drain on public funds while the Ministry of Home Affairs did not like the idea of local governments having to subsidize part of the construction costs (*Japan Times*, 4 October 1978: 2).

However, financial problems caused the cabinet to impose a second moratorium on the construction of new lines. In keeping with the administrative reforms implemented to reduce the debt, spending on infrastructure was frozen in September 1982 and the mega plan was shelved for the next few years.

In December 1985 and then again in August 1986, the National Railways reopened the issue regarding the lines envisaged in the Plan of 1972 (*Japan Times*, 30 August 1986: 2). It wanted the moratorium to be lifted. On 30 January 1987, the cabinet approved, but the plan was revised at the request of the JR Group which did not want to be left holding loss-making sections, as had been the case earlier. This Liberal-Democratic project went much further than what had been asked for by these transport corporations. It included the extension of the Tohoku line till Sapporo as well as the Kyushu (Fukuoka-Nagasaki) and Hokuriku sectors (Figure 3.6). In the same meeting,

the ministers[2] had also stipulated that the new sections of the Shinkansen would be constructed by the Japan Railway Construction Public Corporation so as to reduce the financial burden on enterprises which were to be privatized.

Over the course of discussions held in 1987 and 1988, which were also attended by the JR Group and other local parties concerned about the cost-sharing, the government came to an agreement with influential members of the Liberal Democratic Party. At the end of the summer of 1988, after a few bouts of arm-wrestling between its members, the Committee set up for the construction of the Shinkansen network proposed a schedule for the inauguration of new lines. Though spread over time, it would implement all the major proposals contained in the Plan of 1972 (Figure 3.6 and Table 3.1). An arrangement suitable to all parties was thus adopted. Having as its fundamental aim the profitability of sectors, it contained a timetable for constructing the five new segments based on priority.

Table 3.1
Construction priorities for the extension of the Shinkansen network

Priority	Line	Section
1	Hokuriku	Takasaki (Gumma)-Karuizawa (Nagano)
2	Hokuriku	Kanazawa (Ishikawa)-Takaoka (Toyama)
3	Tohoku	Morioka (Iwate)-Aomori (Aomori)
4	Kyushu	Yatsushiro (Kumamoto)-Nishi-Kagoshima (Kagoshima)
5	Hokuriku	Uozu (Toyama)-Itoigawa (Niigata)

Source: JAPAN. Ministry of Transport. 1992 *Annual Report on the Transport Economy: Summary (Fiscal 1991)*. p. 26.

The Hokuriku line was given top priority for two reasons: its potential profitability and the government's desire to facilitate access to the Nagano region (Nagano), the host-city of the Winter Olympic Games of 1998. The extension of the Tohoku line and the construction of the Kyushu sector were relegated to the end. Studies had shown that they would remain in the red for many years after the commencement of operations.

3.4 ROLE OF THE SHINKANSEN NETWORK IN THE GEOGRAPHIC AND ECONOMIC DEVELOPMENT OF JAPAN

After the end of World War II, the Japanese government concerned itself mainly with state planning. It worked towards the realization of national objectives by being the binding agent in joint action plans. These plans were actually multisector policies

which[2] allowed the public sector to establish its priorities and work towards their realization. Though they were theoretically apolitical, these documents were a little like permanent electoral programs in which one promises here and there to strengthen the infrastructure.

These global plans were the pillars of the developmental policy of Japan. They acted as the signposts directing the development of the Shinkansen network during the decades 1960 to 1990. While the Economic Planning Agency concerns itself with general principles (e.g. improving the quality of life) and socio-economic trends, the National Land Agency's job is to take up these aims and to turn them into geographic objectives which would contribute to the growth of the archipelago (e.g. reduction in transit times).

These plans are then barnacled by flexible ministerial or sectoral plans which are based on the objectives declared at the higher levels. The Shinkansen did not escape this fate. The Transport Ministry and the concerned public corporations adopted their own plans in keeping with the wishes of the executive power.

Between 1955 and 1992, 12 socio-economic and 4 land management plans were published and implemented. As the basis of the strong political will behind the Shinkansen network can be found in these documents, it is important to study them in order to better understand the motives underlying the construction of the railway.

These documents show three fundamental objectives which have stood the test of time and justify the network.

- Reduction in transit times.
- Suppression of psychological and physical barriers which limited the exchange of people and information within the archipelago.
- A better balance between urban and peripheral regions.

The first fundamental aim was to extend the land area which could be traversed in a day's journey. This meant that transport systems would have to be speeded up, resulting in a greater circulation of people and information.

The cherished aim of Japanese planners was the decongestion of the large urban centers by directing the population and economic activities towards the hinterland. Regional business administration centers were established to help ease the social and economic problems faced by Tokyo and Osaka.

[2] The post-war concentration of economic activities within the megalopolis can be explained by favorable geographic conditions (e.g. ports). On the other hand, the hinterland, deprived of investment capital and transport infrastructure remained underprivileged. To stem the increasing socio-economic inequality between regions, the government tried to reconcile national growth to regional development – a task which proved to be particularly difficult.

Behind the official objectives, the Japanese leadership had other, undeclared motives which made it support the Shinkansen network. To begin with, the Shinkansen allowed Japan to retain its position at the forefront of technological research and development regarding rail transport. Secondly, as the trains ran on electricity, it reduced the nation's dependence on foreign oil as every car owner who took to the train consumed less petrol. Finally, the laying of the network generated jobs while curtailing the import of aircraft and the export of capital.

3.5 PLANS FOR SOCIAL AND ECONOMIC DEVELOPMENT

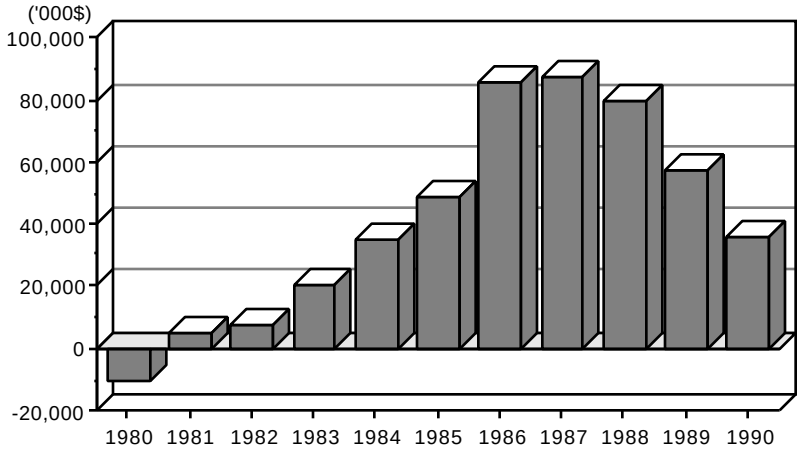
Since the end of the 1950s, the economic development plans attempted to improve the overall standard of living by the means of a mighty economic surge which would then diffuse and spread over the whole land. The idea was to try and mitigate the negative consequences of a high growth rate. Though the land-management schemes were the product of other factors, the general foundations of this plan justified their orientations also.

These objectives were achieved by the development of the hinterland brought about by major investments in social infrastructure such as a growth in housing stock, as well as an improvement of the transportation and communication networks. In this regard, the extension of the Shinkansen network would not only facilitate everyday life by providing a wide range of public services, but also aid in the distribution of wealth. The final result would be a greater development of the nation as a whole. In addition to the generous aid packages and the legislation regarding industrial relocation, the public investment in transport would also help in bridging the gap between the old and new centers of development.

Transportation thus became a lever for socio-economic growth and explains why the aims and activities of the National Railways were seen to be more profitable socially than economically.

[2]The 1970s saw a strengthening of the social factor to which was added the government's growing concern over environmental issues. Concepts like the creation of a *nation of garden-cities* in which the Shinkansen network would be extended in keeping with environmental factors, marked the beginning of a socio-economic policy directed at the creation of a welfare state. The drive towards maximum economic growth at all costs was replaced by the push towards correcting the external diseconomies which that had created.

Figure 3.7: NATION'S CURRENT ACCOUNT BALANCE, 1980-1990



Sources: JAPAN STATISTICS ASSOCIATION (1987) Historical Statistics of Japan, volume 3. p. 100.
JAPAN.Management and Coordination Agency (1991) Japan Statistical Yearbook 1991. p. 359.

In May 1988, after a decade (1975-1985) of re-thinking the Shinkansen network, a plan title *Economic management within a global context* was adopted (Economic Planning Agency, 1988). It placed this kind of social investment at the heart of the new economic policy in Japan. This novel approach aimed at the reduction of the nation's current account balance which, since 1981, had been favorable compared to most of the other member countries of the Organization of Cooperation and Economic development (Figure 3.7). By revising its economic policy based on exports, the government acceded to the demands of its partners, headed by the United States, which wanted it to take some steps in the matter.

3.5 NATIONAL LAND DEVELOPMENT PLANS

The first *National Land Development Plan* was approved in 1962, over a decade after the Parliament had voted into existence the *National Land Development Law* (National Land Agency, 1962). Its salient feature was the creation of new industrial cities outside the Tokyo-Osaka conurbation linked to each other by a transport network.

This would reduce the congestion in this over-populated zone and help in the development of rural areas.

Though novel, this concept did not include an overall strategy which would lead to a reduction of the gap between the living conditions at the center and those of the periphery. The high hopes entertained by the planners came to nothing. The attraction of the large cities, where the benefits of the Japanese economic boom were more easily accessible, proved too strong and resulted in further congestion.

This failure led to the implementation of a second plan in May 1969 (National Land Agency, 1969). It aimed at reducing socio-economic and cultural disparities by promoting inter-regional exchanges. This would result in giving rural residents living standards approaching those of their urban counterparts. The government thus thought of reducing the migration towards the megalopolis as there would then be no real motive to do so. The underlying hope was to standardize the quality of life of its people throughout the land with the help of infrastructure which would underpin a more humane society made up of medium-sized communities living in harmony with the environment.

One of the principal tools of this new land management policy was the establishment of a high-speed communication and transport network linking the seven large urban centers in the archipelago, namely, Fukuoka, Hiroshima (Hiroshima), Nagoya, Tokyo, Osaka, Sendai (Miyagi) and Sapporo (Figure 3.6). By establishing a solid base for the development of new communities, this proposal filled the lacuna in the preceding plan. Thus, with better access to the services provided by the regional centers, the inhabitants of provincial districts could avail of the same benefits as those enjoyed by people living in Tokyo

Having been swept into power on the wave of a surging economy, the governments had not paid much attention to the quality of life of individuals. It was only in the early 1970s that the negative consequences of the Japanese economic boom made themselves felt through the public protests which denounced the environmental damage caused by the industries and the Shinkansen network. To this was added the energy crisis of 1973, which prompted the National Land Agency to formulate new guidelines regarding national development.

In order to calm these protests and to accustom Japanese society to the new international economic conditions, a new *National Land Development Plan* was

announced[2] in 1977 (National Land Agency, 1977). It introduced the concept of *integrated local communities* within which people would live in harmony with nature.

Due to social and economic conditions, this plan put a lid on further expansion of the Shinkansen network. It presented a stand which was diametrically opposed to the plan of 1969 in which the Shinkansen was seen as one of the pillars of the future development of Japan. Though in keeping with the eternal aim of economic growth, this third plan evinced a more environment-friendly political stand which also laid greater stress on the improvement of living conditions than had been done in the past. The government announced its intention to understand better the likely environmental effects of constructing the projected high-speed railway lines.

Despite the fact that the Shinkansen network was relegated to the background, it continued to play an important role in the growth of the nation. It was needed now more than ever to not only distribute but also to decentralize several functions localized in Tokyo. It was hoped that the Shinkansen stations would themselves act as focal points for service industries. Still, the original plan for the network was subject to the improvement of the financial health of the National Railways and the economy.

Ten years later, with an improvement in socio-economic conditions, the Agency published a fourth *National Land Development Plan* (National Land Agency, 1987). Taking up many of the proposals made in earlier schemes, this Plan of 1987 proposed to speed up the construction of the high-speed train and thereby pump life into the peripheral regions. This required that the idea of *integrated local communities* be reinforced as it would bring about a better equilibrium between the different regions of the archipelago. The Shinkansen was thus brought to the fore-front as it offered a means for increasing inter-regional interactions as well as for a better distribution of socio-economic functions over the territory. It would improve human relations by allowing greater freedom of movement for both people and information. It would also give precedence to local co-operative ties over the relation of domination which had thus far existed between the large urban centers and the peripheral regions.

3.6 CONCLUSION

In this chapter, we have presented the principal facets of the evolution of the Shinkansen network right from its inception. It has allowed us to study the forces and the weaknesses which have helped or hindered its implementation since the middle of the 19th Century.

[2] Starting as a transportation development enterprise, the Shinkansen network quickly became a tool for land management. Many hopes were pinned, especially to redress the geographic inequalities which were already present and which had been aggravated by the economic boom. At the same time, the expansion of the network smacks of a strong political flavor, and is thus subjective. Certain decisions, while profitable for some pressure groups, remain questionable regarding their utility in solving the problems of the archipelago.

CHAPTER 4

THE SHINKANSEN NETWORK AND THE GEOGRAPHIC, POLITICAL, SOCIO-ECONOMIC AND TECHNICAL FACTORS THAT INFLUENCED IT

The analysis of content was based on 606 articles published in the *Japan Times* (489 / 80,7%), the *New York Times* (66 / 10.9%) and the *Times* (51 / 8.4%). The large disparity in the number of articles from the Japanese daily and the two others is explained by the fact the while the foreign newspapers reported only the important events regarding the Shinkansen network (e.g. inauguration of a new section), the *Japan Times*, being a national newspaper, systematically covered in detail all relevant news, be they trivial (e.g. a train delayed due to a snow storm) or important (e.g. a new developmental plan for the network).

Table 4.1
Frequency of articles for five peak years, 1938-1994

Year	Number of articles
1964	35
1972	36
1975	29
1982	18
1987	34

Sources: Japan Times, New York Times and the Times. 1938-1994.

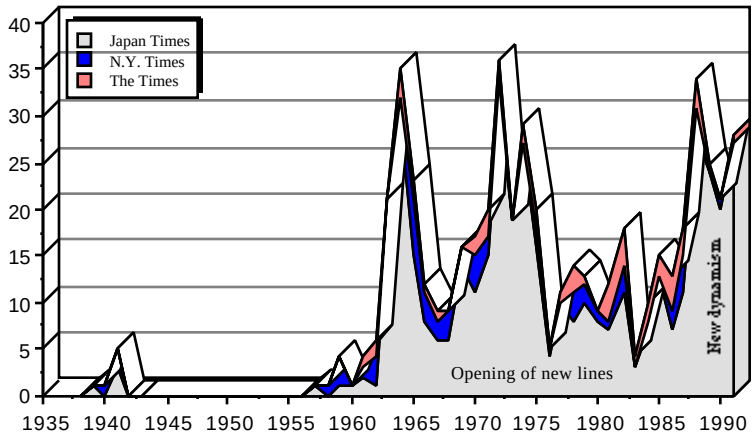
It is not surprising then that the years which saw the opening of a new section of the network would also draw heightened attention from both Japanese and foreign media (Figure 4.1). Accordingly, the largest number of articles coincide with the years 1964, 1972, 1975 and 1982 (Table 4.1), which saw the inauguration of the Tokyo, Sanyo, Tohoku and Joetsu lines respectively (Figure 3.6).

The next five years proved dull from a journalist's point of view. Interest was rekindled in 1987, the year in which the National Railways were privatized, and remained high thereafter as the post-privatization period which followed proved to be especially rich in exciting events. From that watershed year, the companies of the JR

Group[2] had to sit up and break new ground if they were to survive in an environment in which there would be no more any public funds to bail out loss-making operations and cut-throat competition was the rule of the game. Determined to generate profits in spite of all, these companies were led to pay special attention to the needs of their clients.

The result was a strong resolve and a concerted effort towards the development and improvement of the network. The ensuing initiatives were faithfully reported by the *Japan Times*. This new dynamism elicited only a short-lived interest in the foreign dailies in 1987. Their negligence regarding the process of its evolution is readily understandable in view of the fact that these changes were relevant only in the national context or to the informed public.

Figure 4.1: FREQUENCY OF ARTICLES RELATED TO THE SHINKANSEN, 1938-1994



Sources : Japan Times, New York Times and Times. 1938-1994.

It is remarkable that in the period preceding the inauguration of the Shinkansen, that is, from 1938 to 1943 (5 articles) and from 1956 to 1962 (4 articles), the print media has nothing to say about the preparations which led to the implementation of the high-speed train. The *Japan Times* contains only occasional references regarding the progress in the planning and construction of the Shinkansen. During World War II, the obvious war-time priorities prevented any mention of even the major phases in the short life of the forerunner of today's high-speed train.

As for the second period, lack of space in the newspaper as well as a certain indifference towards an idea which was still on the drawing board were the chief reasons due to which the network continued midst media silence. But from 1963 onwards, after some trial runs on the new Tokaido line, interest began growing. These trial runs proved to both journalists and the public that this project was serious, that the

Shinkansen[2] would make the automobile and the airplane run for their money and that this dream was finally on the point of being realized.

4.1 THE MAJOR CONTRIBUTORS

The analysis of content of these three newspapers reveals that there was a limited number of governmental and societal contributors who dealt with matters regarding the Shinkansen (Figures 4.2 to 4.4). Among them, the concerned state agencies and public corporations appear as being at the helm. This though is brought out much more clearly in the *Japan Times* (80.4%) than in the *New York Times* (65.6%) or the *Times* (46%).

JNR (JR Group) occupy a predominant place in these publications (Japan Times: 53.2%, New York Times: 46.2%, Times: 35.2%). Not surprising considering the fact that the analysis of content was done by using key words which favored such a tendency. Moreover, all questions regarding this network led directly to this corporation.

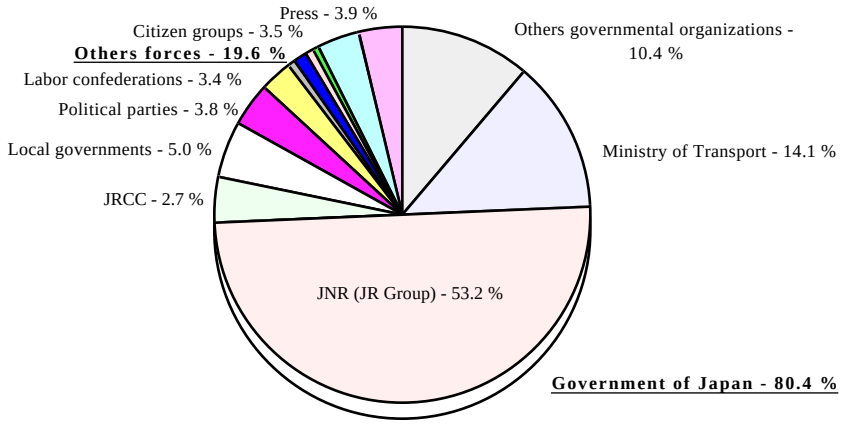
It must be noted that a number of articles in the *Japan Times* dealt only with a mere description of the events linked to the business activities of this public corporation (e.g. speed records). Often they were sanitized reports based on official statements or official press conferences. Though this preferential reporting was curbed somewhat in the 1980s, societal factors ended up being greatly underrated (Japan Times: 19.6%, New York Times: 34.4%, Times: 54%). On the other hand, the foreign media, though dominated by JNR (JR Group) found space for wider ranging and more critical articles which brought to light other influential forces, their hopes and aspirations.

At first sight it would seem that within the government institutions (Japan Times: 80.4%, New York Times: 65.6%, Times: 46%), decision-making powers rested with JNR (JR Group), the Ministry of Transport (Japan Times: 14.1%, New York Times: 5.4%, Times: 2%) and JRCC (Japan Times: 2.7%, New York Times: 2.2%, Times: 1%).

The results of the study appear to indicate that the Japanese politico-administrative system revolved round an autonomous, closed-circuit within which societal forces evolving within the environment had no say in the Shinkansen network. This is a wrong impression based on the documents used for the analysis of content. The problem lay in the use of newspapers as the data source. In general, newspapers are apt to miss out on the influence of societal factors as well as their invisible links with the governmental apparatus. Along with the legal authorities, groups formed close to

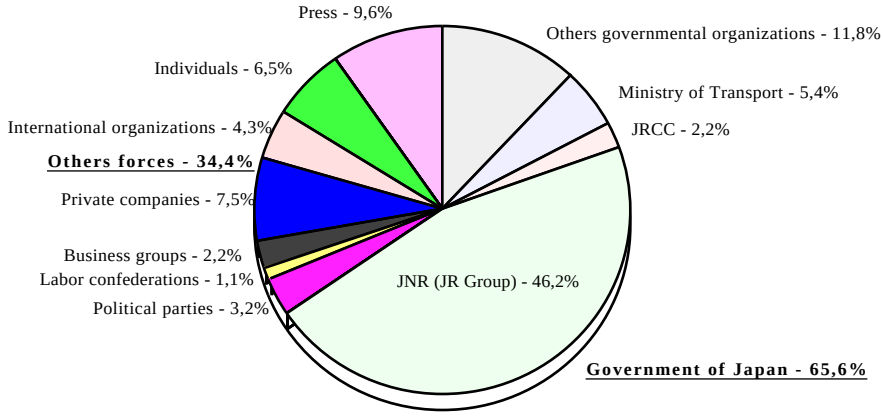
2

Figure 4.2 : THE JAPAN TIMES AND THE SOCIETAL FORCES, 1938-1994



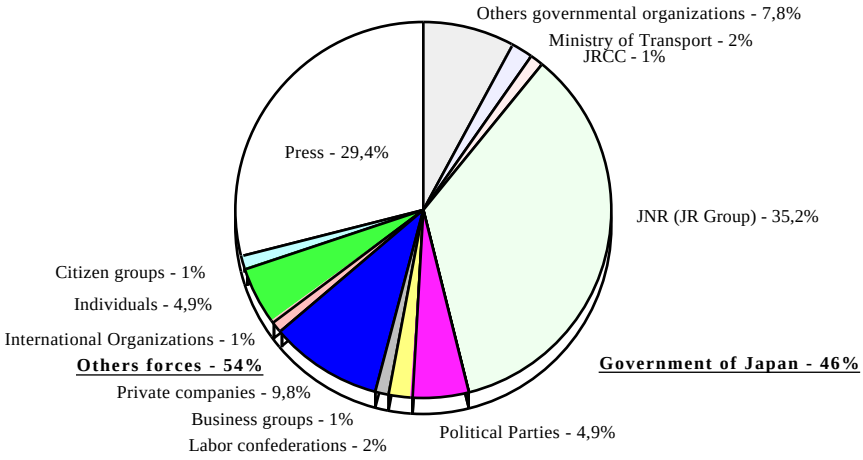
Source: Japan Times. 1938-1994.

Figure 4.3: THE NEW YORK TIMES AND THE SOCIETAL FORCES, 1938-1994



Source: New York Times. 1938-1994.

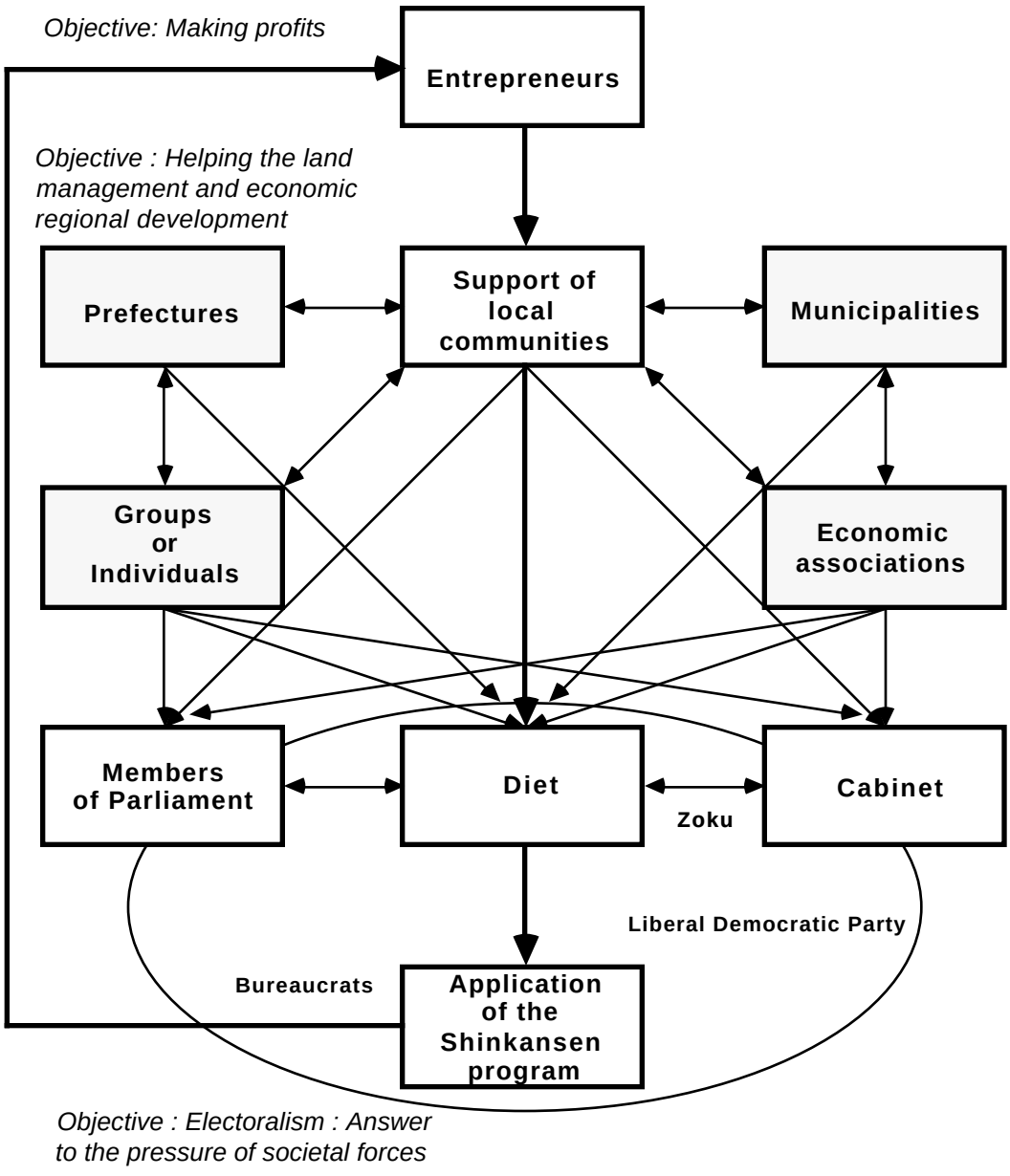
Figure 4.4: THE TIMES AND THE SOCIETAL FORCES, 1938-1994



Source: Times. 1938-1994.

the government[2] had a major influence on the direction of the program. Their powers of persuasion was proportional to their political and economic clout in Japanese society. More often than not, the decisions taken and the course set by the official agencies originated from one of five power centers: the Liberal Democratic Party (Japan Times: 3.8%, New York Times: 3.2%, Times: 4.9%), the governmental apparatus, local administrations (Japan Times: 5%, New York Times: 0%, Times: 0%), management boards and citizen groups (Japan Times: 3.5%, New York Times: 0%, Times: 1%) (Figure 4.5).

Figure 4.5: DEVELOPMENT PROCESS OF THE SHINKANSEN NETWORK



[2] The Liberal Democratic Party, which held the reigns of power was also the doorway which led to the directorial levels. Members of Parliament from within this Party who also happened to be Cabinet Ministers or formed part of the informal groups directing governmental agenda (*zoku*), wielded special decision-making powers as regards the Shinkansen network. The link was so strong that the Party played a fundamental and dynamic role at the heart of the program. It was the main channel through which the societal forces routed their demands and received government sanction. Intererest groups used it to access members of the Diet or the government and lodge their petitions regarding the railways.

Many articles evidence the ubiquitous presence of the Party in the decisional process regarding the program, leaving little doubt about its importance. The articles covering the power struggles over the construction of new lines in the 1980s are a case in point. By basing ourselves on these established reports, we can deduce the underlying currents of the sometime convergent, sometime clashing interests of beaurocrats, politicians and societal factors.

> It is now being discussed between the government and the Liberal-Democratic Party as to when the construction of the new Shinkansen line is to be started. However, due to the government's austerity policy, it is still unclear whether the construction work can be started by the end of fiscal 1987 (Japan Times, 30 August 1986: 2).
>
> The government Friday scrapped a 1982 Cabinet decision which froze construction of new shinkansen line (bullet train) projects, and gave the goahead for expanding shinkansen services across the nation.
>
> The decision was made during a Cabinet meeting based on an agreement reached between the government and the ruling [...] Party at the end of last year (Japan Times, 31 January 1987: 2).
>
> Four Japan Railway companies were negative about a government plan to construct eight new shinkansen routes [...].
>
> Kichizo Hosoda, a Lower House member who sits on the committee on shinkansen construction, said at a committee meeting Thursday that the "light of hope" for new shinkansen routes should not be allowed to flicker out.
>
> Transport Minister Shintaro Ishihara also stressed that the idea should not be dropped.
>
> While local residents have called loud and clear for the rapid-transit lines, the plan is on ice because the who and how of financing is still up in the air.
>
> [The Minister of Finance said that] the government would not fund projects that "benefit specific people" (Japan Times, 18 December 1987: 2).

> [2] Governors of prefectures along the planned Hokuriku Shinkansen Line expressed their satisfaction Thurday with the government and LDP decision to put priority on the construction of the Takasaki-Nagano section of the line (Japan Times, 2 September 1988: 3).
>
> The decision was made after a heated debate between the government and LDP leaders over the issue.
>
> A source close to the party said some LDP members had fought for new shinkansen lines to their constituencies as a key to deciding the results of the second round of nationwide simultaneous local elections in February (Japan Times, 25 December 1990: 12).

The apparent harmony between the different elements of Japanese society regarding the geographic development of the network turns out to be an illusion. The elected representatives of the people, Cabinet ministers as well as other bureaucrats were often divided regarding the necessity of extending the railway.

In order to please their electorate, representatives of the regions by-passed by this transport, did not hesitate to mount an intense campaign directed at the concerned authorities. The extension of the network was associated with economic progress by both the members of the Liberal Democratic Party, whose electoral base was in the rural regions, as well as by the local populace.

> Generally speaking, people and local government in less developed areas are not so concerned about the development vs. anti-development debate. For the most part, they still wish to invite new industries into their areas in order to improve their standard of living. This prevailing attitude constitutes a political resource for development-oriented leaders in the LDP. Working with these pro-development groups, former Prime minister Kakuei Tanaka proclaimed his plan to reconstruct the Japanese archipelago (Muramatsu, 1975: 810).

For the people in districts often neglected by public investments, a Shinkansen station was proof that the governing authorities had not really forgotten them. In return, the structure often became a means of raising a monument to the glory of the politician who had brought it for his constitutents. The Gifu-Hashima (Gifu) station on the Tokaido line in the constituency of Bamboku Ono (1890-1964), an otherwise respected political personality, is a case in point. Such generosity at the cost of national interest, sullied the National Railways. Though politically justified, this edifice remained under-utilized for many years.

> A prime example of “cooperation” was the way in which an “elder statesman” of the Liberal Democratic Party, one Bamboku Ono, used his personal influence to force the construction of a totally redundant station in a small, unimportant town by the New Tôkaidô Line. As it happened, the

> town Gifu-Hashima was his birth-place, and to the great irritation of travellers whose time is wasted every time the train stops amid the fields surrounding the station, the townspeople erected a bronze statue of Ono in front of the station as a token of thanks (Isomura, 1972: 455).

At the same time, for every advocate of the high-speed train within the government, there were those who, more concerned about managing the public debt, opposed the extension of the network into regions where the economic profitability seemed far less assured than political or geographic benefits. When the Transport Minister announced a plan for constructing eight new Shinkansen lines, a member of the Finance Ministry flatly declared the absurdity of such a project as far as the public finances were concerned.

> [This project is] "one of the three most foolish plans" of the Showa government, putting it alongside the construction of the battleships *Yamato* and *Musashi* during World War II and the reclamation of Ise Bay and construction of the Sekian Tunnel connecting Honshu and Hokkaido (Robins, 1988: 69).

Many of the economic orientations adopted by the government in the years since 1950 had been initiated by the Japan Federation of Economic Organizations (Keidanren), the watchdog safeguarding the interests of the business world. The Shinkansen too did not escape as the two moratoriums on further expansion of the network imposed by the Cabinet in 1974 and 1982 had been proposed by members of the employers' union. They wanted to limit public expenditure, reduce the deficit and thus postpone tax hikes which would only adversely affect the profits of the private sector.

Though earlier it had supported the moratoriums, once the National Railways had been privatized, the association now wanted the Shinkansen network relaunched. Freed of many administrative and labor constraints, the JR Group would no more be a financial burden on the State. At the same time, the world's economic situation also leant itself to these investments. Henceforth a geographic expansion of the network could only serve to benefit all concerned.

The interest and consequent influence of employers and senior politicians was confined mainly to financial matters such as the privatization of JNR or the impact of new sections on regional development. And even though these forces do not show themselves in the representativeness of interest, a little reading clearly reveals their presence.

> [2] Leaders of major Hokkaido, Tohoku, Kansai, Hokuriku and Kyushu business organizations Tuesday issued a joint statement for early implementation of pending new Shinkansen line projects.
>
> The two major hurdles to the new lines - fiscal reform and restructuring of the Japanese National Railways - have almost been solved, said Keigo Haratani, president of Hokuriku Federation of Economic Organizations.
>
> The government should carry out the pending projects as soon as possible, both as a response to external pressures for boosting domestic demand and as a solution to recent problems arising from concentration of business and administrative functions in the Tokyo area, he added (Japan Times, 2 March 1988: 9).

This passage shows that after having at first urged the directors to be prudent, the Federation now had changed its tune and encouraged extending the network. Six months after the publication of this article, the Administration and the Party gave the geen signal for the construction of the Hokuriku line (Figure 3.6).

Local matters, for example the selection of the site for a station, are decided by the local representatives, communities and regional forces. They also have a say in the deployment of the network and its layout.

All these forces interacted via the means of intense campaigning at local as well as national levels. Many regional groups which coveted the high-speed train, did not hesitate to approach Members of Parliament and government organizations by going directly to the head office of the Liberal Democratic Party in Tokyo and ask for their due. They would often seek to influence the decision-makers through personal contacts. On the other hand, in addition to these favorable societal elements, there were also those groups of individuals who were greatly inconvenienced by the presence of a Shinkansen line close to their home. Their activities will be taken up more in detail at the end of this chapter.

According to widespread opinion, the creation of the JR Group radically changed the rules of the game. Politicians would now find it much more difficult to influence the management of these privatized enterprises which were concerned primarily with commercial profitability. But, despite the fact that economic viability was the guiding principle behind their activities, the government retained for itself the right to construct new lines. It still held a major financial stake and was very much in charge of construction work by the means of the contractorship of the JRCC.

In January 1987, following an intensive campaign, the Cabinet lifted the moratorium of 1982 regarding the extension of the network and approved of the

construction[2] of eight new Shinkansen lines. In the months that followed, most of the JR Group of companies evinced a muted interest for this ambitious plan, reluctant to leap forward with closed eyes. Though the JR Group had always been ready to accommodate certain political quarters, these "electoral gifts" to the people had to prove themselves profitable not only politically but also economically. One of the greatest benefits of privatization, this new-found autonomy was further reinforced in 1993 when the government began to sell the shares of these companies on the stock market.

The analysis revealed two types of contributors. First, those who had a direct effect on the development of the railway and on whom depended the extension of the network. And those with a passive function, that is to say, contributors who may be designated 'spectators'. The first have just been dealt with in this presentation.

Though societal forces also incluse private enterprises (Japan Times: 0%, New York Times: 7.5%, Times: 9.8%), those which could be identified had in general little, if any, effect on the network. They consisted mainly of the domestic airlines (All Nippon Airways, Japan Air System) which had been adversely affected by the strong competition generated by the high-speed train.

Though it does not show, private enterprises, either involved remotely or closely with the construction of the network, or which benefited from it, were quite active within the environment. They had a direct influence on the directors of the railway by the means of financial contributions to political parties or by participating in campaigns organized by the Keidanren (Japan Times: 0%, New York Times: 2.2%, Times: 1%).

Prior to privatization, the labor confederations (Japan Times: 3.4%, New York Times: 1.1%, Times: 2%) figure regularly in the picture because, for many years, the National Railways were the most important bastion of proletarian advocacy in Japan. The high-speed train was hit a number of times by worker agitations.

From its very inception, the Shinkansen network had been covered by feature articles in the foreign press as well as by editorials in the *Japan Times*. Moreover, the overseas newspapers also contain open letters regarding the high-speed train in their letters-to-the-editor section. These chronicle and reflect the public opinion of tourists who, in the course of a recent trip, had the occasion of enjoying a ride on the 'Bullet Train'.

[2] Finally, we must also include the international groups (Japan Times: 0%, New York Times: 4.3%, Times: 1%) affiliated to the United Nations. The World Bank financed a part of the construction of the Tokaido line. Subsequent to a conference held in Tokyo in April 1963, the United Nations Economic and Social Commission for Asia and the Pacific also declared itself interested in the project. Nevertheless, in reality, their presence was short-lived, confined to the period 1956 to 1971.

4.2 GEOGRAPHIC REPRESENTATIVENESS

It is no great surprise that since 1938, the region of Tokaido (>50%) dominates all geographic representativeness in matters dealing with the societal forces (Figures 4.6 to 4.8). This megalopolis contains a large chunk of the country's population and by that very fact is the center of important traffic circulation.

In the study of the contributing factors, the national capital recurs with the greatest frequency. As the terminal point of three operational networks and of all projected extensions, Tokyo figures in almost all the articles analyzed. Till the mid 1960s, all the dailies referred only to the Tokaido as it was the only one in operation. In the years following the inauguration of the line and despite the fact that the Tokyo-Osaka section dominated all talk, new regions were already being considered as possible Shinkansen routes.

Gradually, the Sanyo, Tohoku and Joetsu lines as well as JNR (JR Group) testing facilility at Miyazaki (Miyazaki) grew in importance in the eyes of societal agents. To these were added, as mentioned in the *Japan Times*, other expansion projects which were little known overseas: the Narita, Hokuriku and Kyushu lines (Figure 3.6).

The analysis of content of this Japanese daily shows that from 1938 to 1994, almost all the prefectures of the archipelago were short listed to get the high-speed train. The only exceptions were Mie, Nara, Shimane and Wakayama which, sparsely populated and hardly urbanized, did not justify, either economically or politically, an extension of the network (Japan. Management and Coordination Agency, 1991: 29-31). Moreover, being located geographically at the fringes of the large socio-economic regions of the country, hardly any attention was paid to them. Compared to the Japanese daily, the list of prefectures neglected in the foreign media is much longer (five prefectures in the *Japan Times* against twenty in the *New York Times* and twenty-one in the *Times*). This large discrepancy may be due to the fact that foreign newspapers were more interested in operational sections or those nearing completion than in long term projects.

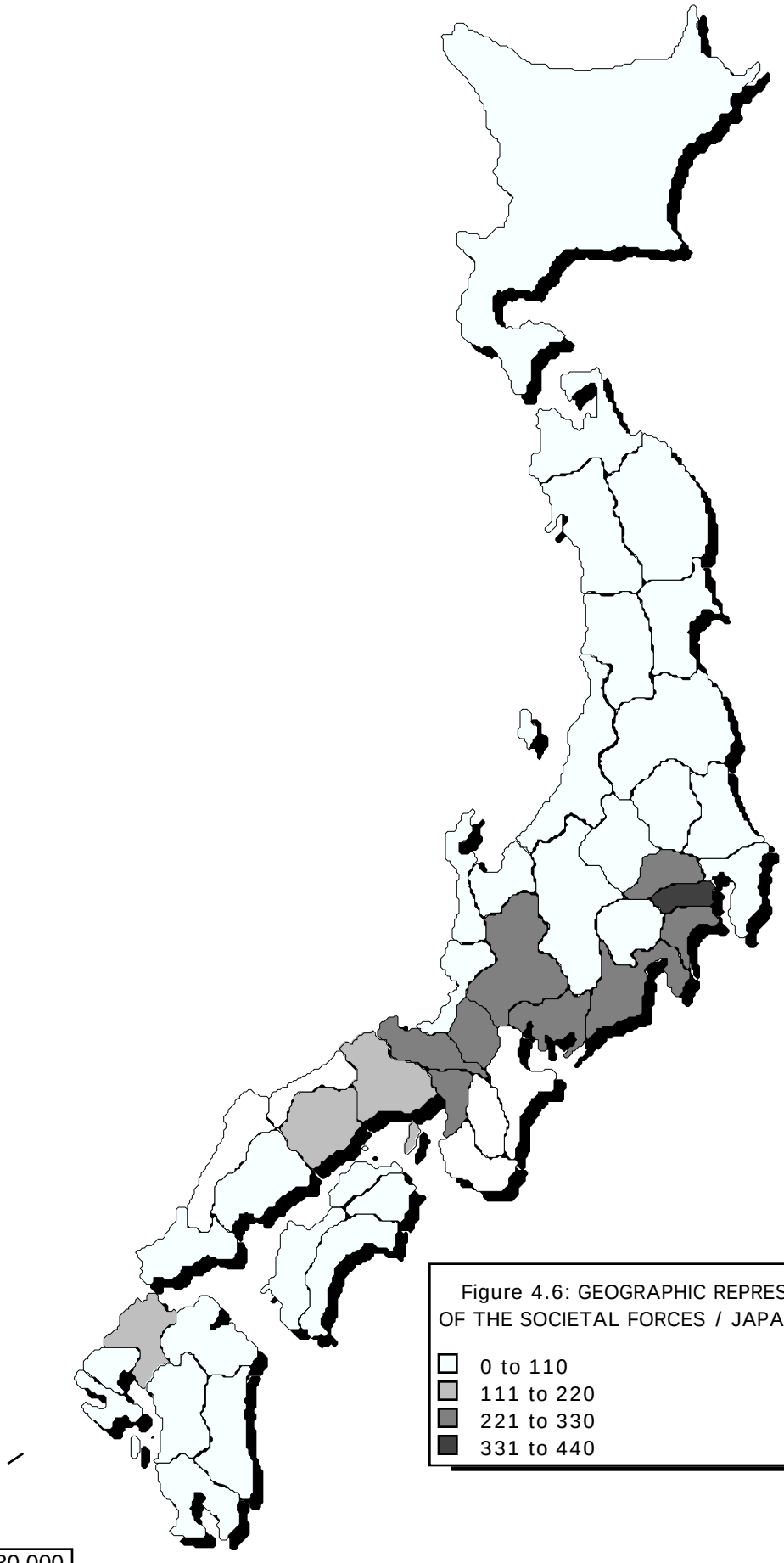


Figure 4.6: GEOGRAPHIC REPRESENTIVENESS OF THE DISCOURSE OF THE SOCIETAL FORCES / JAPAN TIMES (Frequency). 1938-1994.

- 0 to 110
- 111 to 220
- 221 to 330
- 331 to 440

Scale 1: 8 330 000

Source: Japan Times. 1938-1994.

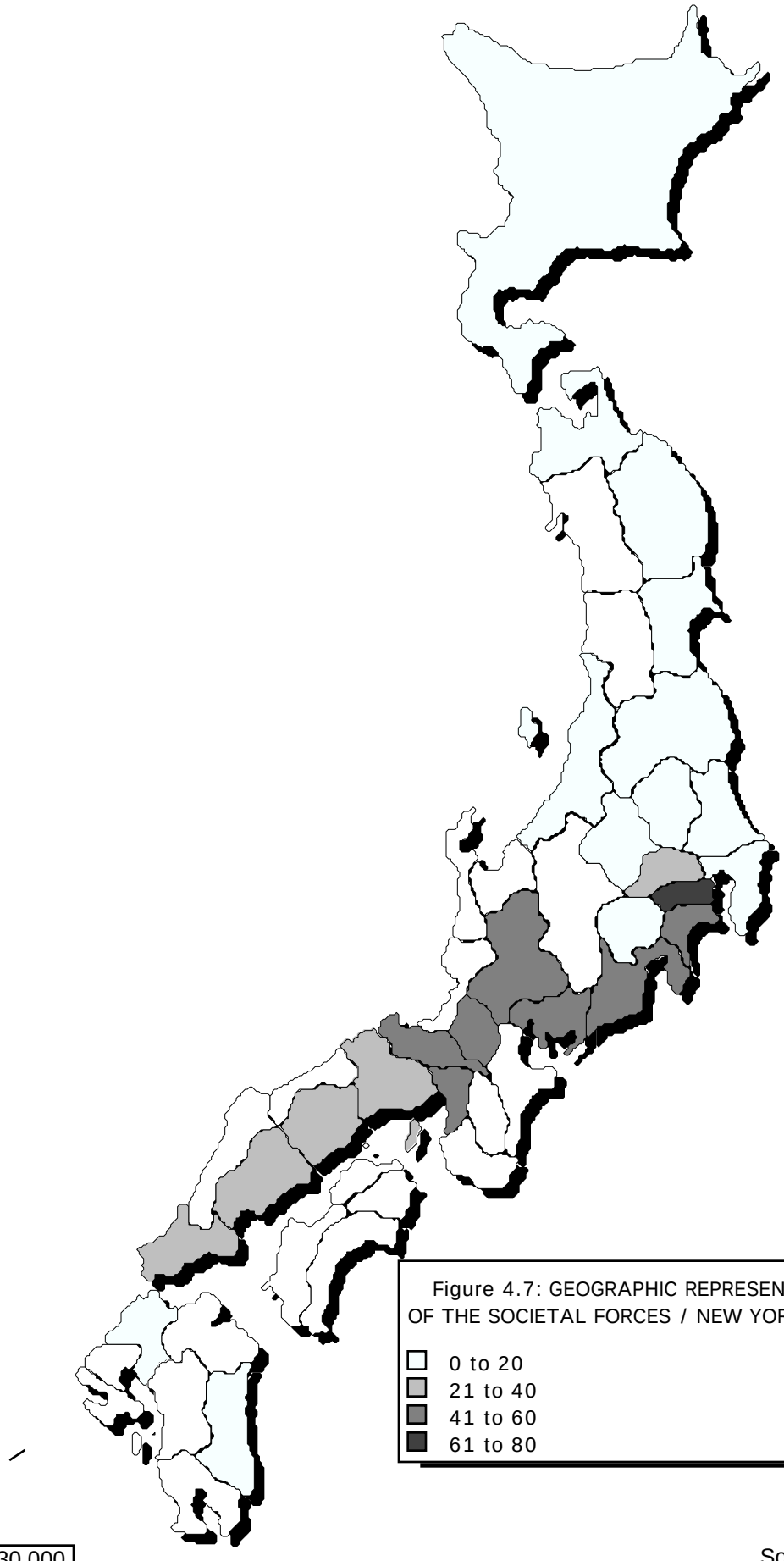


Figure 4.7: GEOGRAPHIC REPRESENTATIVENESS OF THE DISCOURSE OF THE SOCIETAL FORCES / NEW YORK TIMES (Frequency). 1938-1994.

- 0 to 20
- 21 to 40
- 41 to 60
- 61 to 80

Scale 1: 8 330 000

Source: New York Times. 1938-1994.

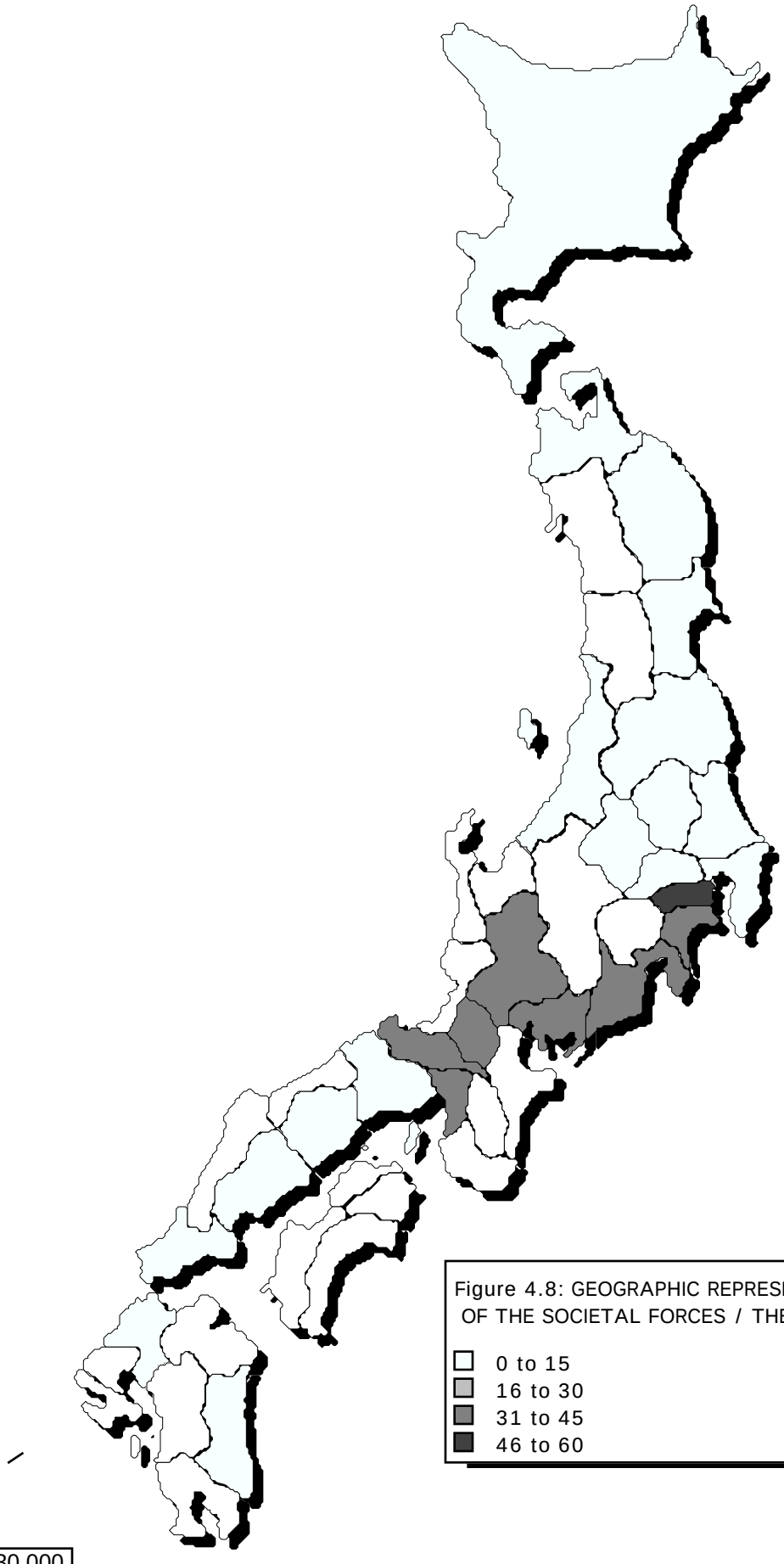


Figure 4.8: GEOGRAPHIC REPRESENTATIVENESS OF THE DISCOURSE OF THE SOCIETAL FORCES / THE TIMES (Frequency). 1938-1994.

- 0 to 15
- 16 to 30
- 31 to 45
- 46 to 60

Scale 1: 8 330 000

Source: The Times. 1938-1994.

4.3. REASONS FOR THE CONSTRUCTION OF THE HIGH-SPEED TRAIN[2]

An analysis of the forces clearly leads to the socio-economic aspects of the Shinkansen network. A trend which is seen in 61.6% of the articles in the *Japan Times*, in 51.2% of relevant reports in the *New York Times* and in 62% of the cases in the *Times* (Figures 4.9 to 4.11).

It might seem rather surprising that regional land management (Japan Times: 21.9%, New York Times: 29.2%, Times: 22.1%) and economic regional development (Japan Times: 16.5%, New York Times: 19.6%, Times: 15.9%) elicited little interest from the contributors. There is hardly any mention of the utility of the network in the creation of new urban or industrial centers. Similarly, its role in the commercial and industrial development of the nation seems also to have been overlooked. Perhaps these trends underlay all matter regarding the community, but they could not be induced from the matter analyzed.

Interestingly, the expectations of the societal forces proved to be more cursory and marginal than anticipated. They were on the whole content with results which could be had in the short- and mid-term, such as an improvement in the mobility of people or a reduction in pollution.

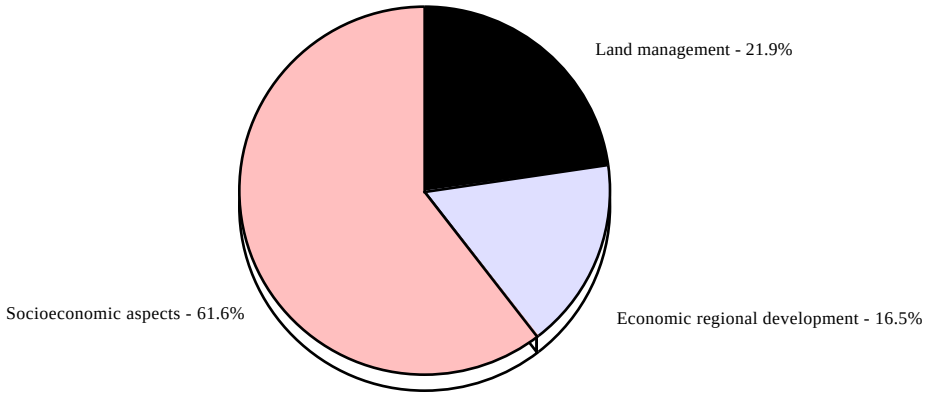
It would be useful now to point out the expectations which were most appealing within each of these categories (Figure 4.12). Concerning land management, two hopes recur regularly: 1) mobility of people; and 2) protecting the environment.

The Shinkansen is seen as a geo-planning tool (188 articles) because it allows the free flow of people from the periphery to the large urban centers. The network is no more thought to be an instrument for decentralization and decongestion from the great urban centers towards the periphery (123 articles). According to the articles analyzed the idea which emerges is more for bringing people closer to the political and economic centers than the other way round. Accordingly, the high-speed train is called upon to improve access to the two great metros. It would thus help to spread out the population because people would not have to live close to the suburbs of Tokyo and Osaka any more in order to benefit by the employment opportunities created by the economic growth in these regions.

From the same perspective, an increased mobility became more important as it meant a substancial reduction in commuting time and thus led to an improvement in the standard of living for the salaried Japanese.

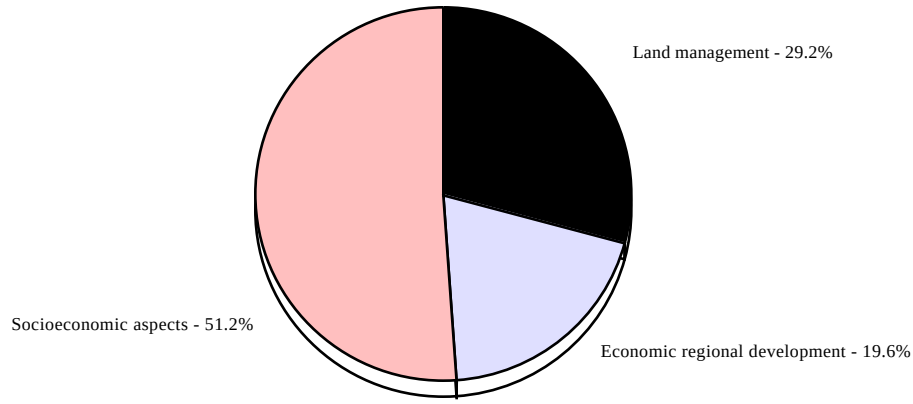
2

Figure 4.9: THE JAPAN TIMES AND THE VESTED INTERESTS, 1938-1994



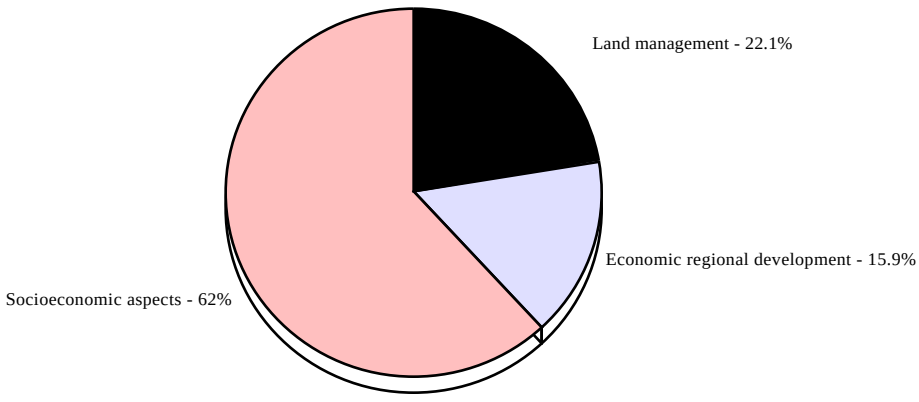
Source: Japan Times. 1938-1994.

Figure 4.10: THE NEW YORK TIMES AND THE VESTED INTERESTS, 1938-1994



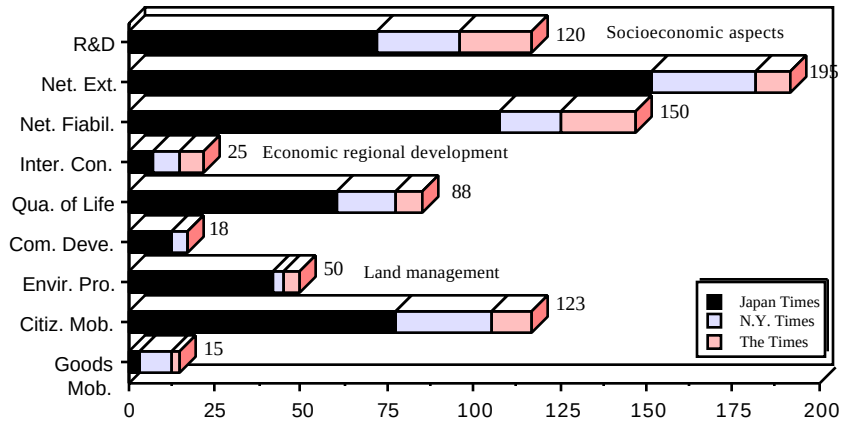
Source: New York Times. 1938-1994.

Figure 4.11: THE TIMES AND THE VESTED INTERESTS, 1938-1994



Source: Times. 1938-1994.

Figure 4.12: MAIN VESTED INTERESTS, 1938-1994



Source: Japan Times, New-York Times and Times. 1938-1994.

As for the environmental issues (50 articles), they reveal the presence of both positive and negative effects of the network. On one hand, the Shinkansen was perceived as a means of reducing the country's energy consumption as well as travel by other modes of transport which, like the automobile, contributed to air pollution and a wasted precious land (motorways require a lot of space). On the other hand, within the geographic and demographic situation of the archipelago, the high-speed train was also the cause of a number of environmental problems.

As for the regional economic growth (131 articles), the network was expected to improve living standards (88 articles), aid the commercial and tourist sectors (18 articles) and help sustain a free flow and interchange of market forces. As it was designed to ferry people and not hauling cargo, it was understood that all these involved human activity.

Among the most popular socio-economic aspects (465 articles) was the strong desire for the construction of new lines (195 articles). On the other hand, the railway management, especially after privatization, was preoccupied with reliability (150 articles) concerns and numerous points regarding research and development (120 articles). The main theme was to increase the speed, reduce transit times and give the airlines a run for their money.

4.4 THE RECOMMENDED FUNCTIONAL MEANS

Before presenting the results regarding the functional means recommended or noticed, a fine-tuning of the methodology is required. Among all the variables of this

study[2], this one elicited the greatest number of 'Not Applicable' (N.A.), a response which figured in more that two thirds of the documents analyzed. In order to show more clearly the functional means, this option has been excluded in Figures 4.13 to 4.15.

The major conclusion of this analysis is that the large majority of forces were in agreement regarding the beliefs and values underlying the Shinkansen. The central government owed it to itself to subsidize the construction of the network. Even after the National Railways were privatized, this option always remained in the equation, even when other financing schemes came to be considered.

In all the newspapers (Japan Times: 63.5%, New York Times: 66.7% and The Times: 35%), the financial aspect (cost) of the network topped the list of the recommended or noticed functional means. Proof that the contributors were most interested in this factor, especially during periods of economic recession. Beside environmental constraints, it was the question of the profitablility of new lines which constituted the main obstacle in extending the network throughout the land.

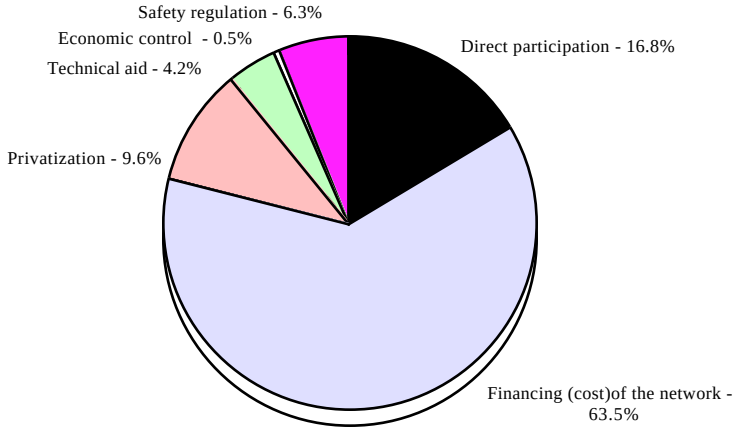
In second place (third in the case of the *Times*), comes the direct participation of the government in the administrative and financial management of the network (Japan Times: 16.8%, New York Times: 22.2% and The Times: 20%). Over the period of the program, the leadership regarding the administration of the Shinkansen was never questioned. However, privatization (Japan Times: 9.6%, New York Times: 11.1% and The Times: 35%) led the government to gradually cede many aspects of the management of the network (i.e. ownership) to JR Central, JR East and JR West.

Finally, it is not surprising that the third rank (second for the *Times*) belongs to privatization. Hardly mentioned in the 1960s and 1970s, this style of management drew attention only in the 1980s. Even so, the forces were in agreement regarding the role which was to be played by the government in the implementation of the Shinkansen network. They gave it an active part in the financing and in charting out the major orientations of the program.

Despite the fact that in the 1980s and 1990s the government was hard up, with meager financial resources, it continued to subsidize the network. Though financial considerations jusitified such a step, it was taken more for the electoral support it would garner from the rural constituencies. Above all, it was a means of demonstrating to the people the good faith of the Liberal Democratic Party regarding the development of regions lacking in transport infrastructure.

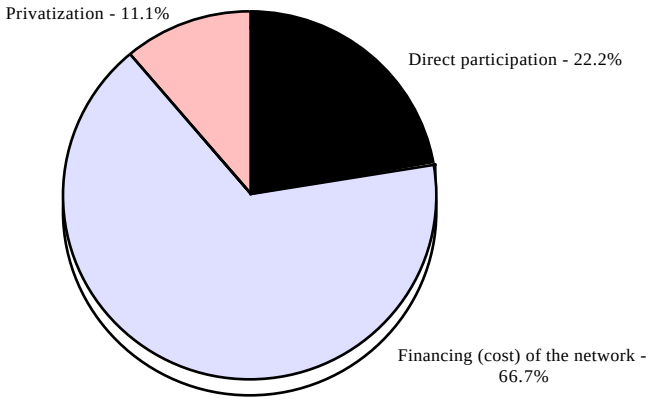
2

Figure 4.13: THE JAPAN TIMES AND THE OPERATIONAL METHODS, 1938-1994



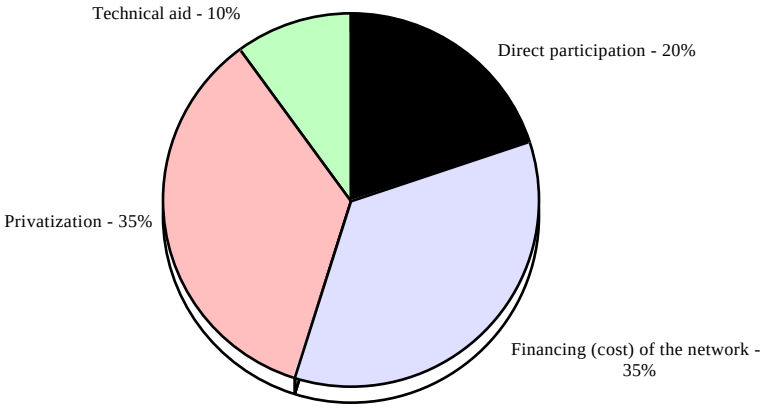
Source: Japan Times. 1938-1994.

Figure 4.14: THE NEW YORK TIMES AND THE OPERATIONAL METHODS, 1938-1994



Source: New York Times. 1938-1994.

Figure 4.15: THE TIMES AND THE OPERATIONAL METHODS, 1938-1994



Source: Times. 1938-1994.

[2] Finally, technical aid, economic control and safety regulation appear on the sidelines (≤10%). Totally absent in any of the articles of the *New York Times*, these three factors, though present, appear marginalized in the *Japan Times* and even more so in the *Times*.

In the *Japan Times*, security regulations occupy 6.1% of the space, distributed over two periods (1963 to 1967 and 1972 to 1975) during which the high-speed train was worst hit. In the first months of commercial operation, some acts of vandalism and numerous running-in problems (e.g. mechanical and electrical failures) led to the adoption of stringent security norms which resulted in the smooth and safe functioning of the train (Japan Times, 17 November 1966: 3).

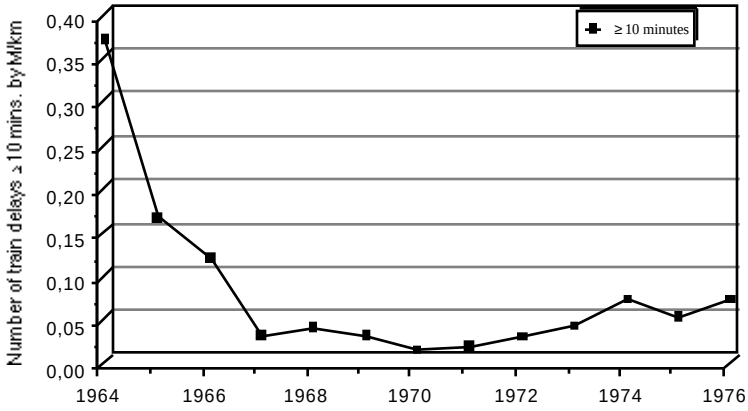
In 1963, misgivings regarding some irregularities in the granting of manufacturing contracts led the daily to raise, in an editorial, the matter of the dangers inherent in such dubious deals regarding public safety.

> [...] Rather it is the human lives - possibly hundreds and even thousands of them - because corruption in contract awarding may mean failure to meet safety specifications in the work executed (Japan Times, 8 July 1963: 12).

Then again, in the early 1970s, the reliability of the network was sullied temporarily by mechanical and electrical problems caused by material wear (Figure 4.16). Severely tested on a daily basis since its inauguration, it began to show signs of age. When these problems evoked criticism, JNR was compelled to invest heavily in a massive plan to rejuvenate the network and extend its operational life.

Technical aid was mentioned in English and Japanese newspapers 10% and 4.2% of the times respectively. The activities of the National Railways (JR Group) in matters of international cooperation were grouped under this heading.

Figure 4.16: FREQUENCY OF MAJOR MALFUNCTIONS (1964-1976)



Source: KUBO, S. (1980) Maintenance System: Vehicules. p. 407.

4.5 ATTITUDES OF SOCIETAL AGENTS TOWARDS THE SHINKANSEN

Before concluding this chapter, it would be desirable to present the general attitude of societal agents towards the Shinkansen network.

Overall, there is general concensus among all the concerned parties regarding a favorable reaction to the high-speed train. Still, the enthusiasm varies depending on the media analyzed, the societal forces considered and the time span (years) studied. While the response according to the *Times* was a tepid 54.9%, the *New York Times* waxed eloquent about the network a whopping 80.6% of the time (Figures 4.17 to 4.19).

As for negative feedback, the count mounts from 7.5% in the *New York Times* to 33.1% in the *Japan Times*, with the *Times* somewhere in between at 25.5%. Finally, there was a small but significant number of articles which proved neither positive nor negative.

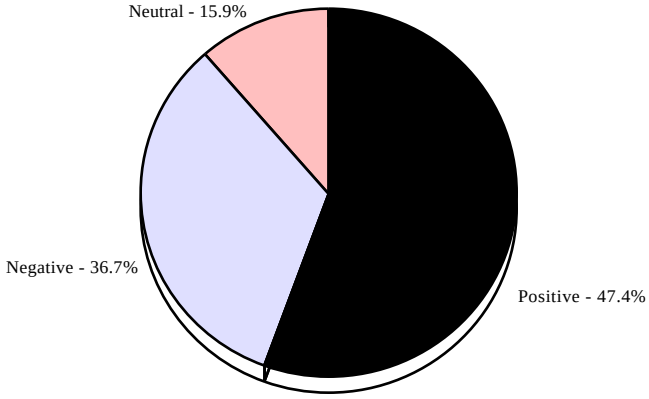
The ambivalence of the Japanese regarding the Shinkansen was mirrored in the *Japan Times* (Positive: 47.4% vs Negative: 36.7%). The high-speed train was often indirectly tainted by the bad reputation of JNR which operated it and the the syndicates which frequently interfered in its functioning. The domestic problems caused by the Shinkansen in the 1970s and 1980s, such as sound pollution and land speculation, added to the muddle.

The biggest divide in the sentiments regarding the Shinkansen network was found in citizen's movements. Opinions differed drastically depending on the place of origin (rural vs urban) of these groups. Being sparsely populated, the rural countryside was but little affected by the noice and vibrations created by the high-speed train and the anticipated socio-economic benefits stood out loud and clear.

In the winter of 1971, when the government announced its plan to construct the Tohoku line linking Tokyo to Morioka (Iwate), the residents of the prefectures of Aomori and Iwate launched a vast campaign for a trajectory which would benefit them. They were contested in this by the residents of Akita and Yamagata who also wanted their share of the rail cake (Japan Times, 2 October 1971: 3). This shows the keen interest elicited by the program in certain regions.

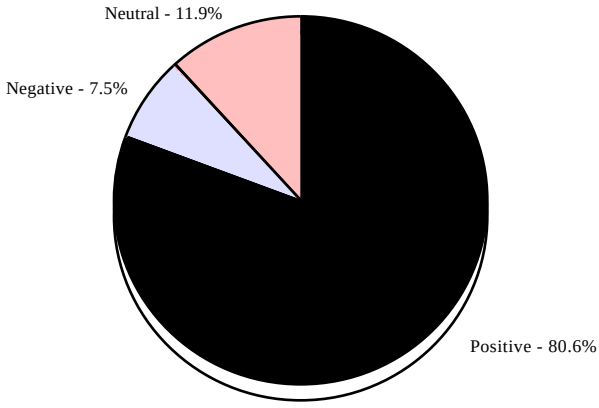
2

Figure 4.17: THE JAPAN TIMES AND THE ORIENTATION OF THE DISCOURSE, 1938-1994



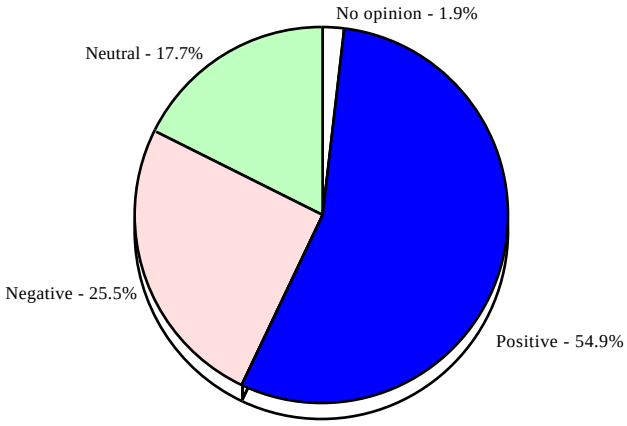
Source: Japan Times. 1938-1994.

Figure 4.18: THE NEW YORK TIMES AND THE ORIENTATION OF THE DISCOURSE, 1938-1994



Source: New York Times. 1938-1994.

Figure 4.19: THE TIMES AND THE ORIENTATION OF THE DISCOURSE, 1938-1994



Source: Times. 1938-1994.

During the same period and as part of the protest movements begun in the 1960s, opposition groups formed themselves in the city of Nagoya (Aichi) and around Tokyo. Seeing that there were few benefits for their community, they launched a strident campaign against the Shinkansen which they claimed threatened their living standards and devaluated their property. In this regard, two famous cases may be mentioned: those of Narita (Chiba) and Nagoya.

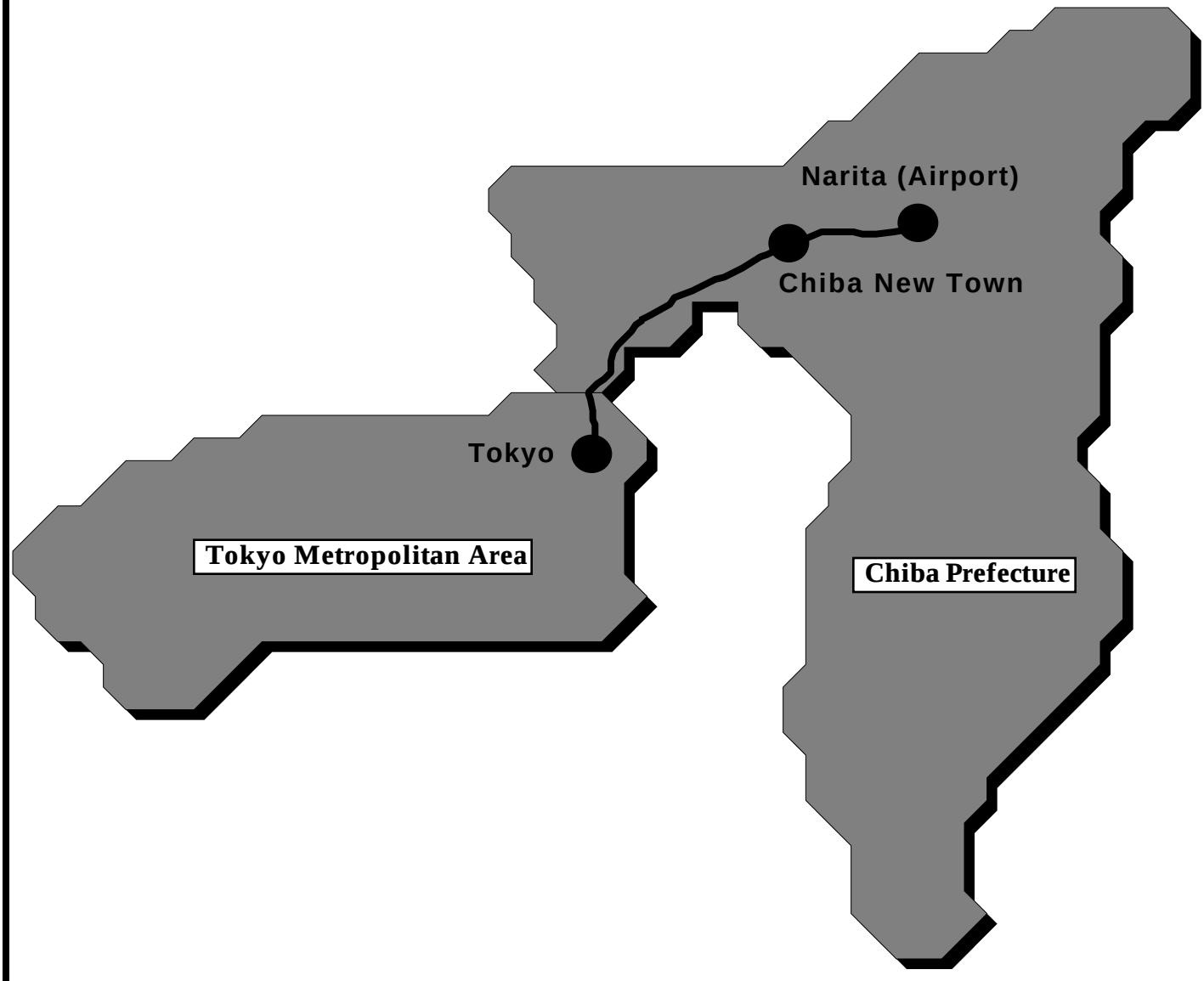
In January 1971, the Railway Construction Council, an advisory body to the Transport Ministry, recommended that the Shinkansen network be extended. A year later, in a meeting with the Minister of Transports, the directors of the Japan Railway Construction Public Corporation unveiled the proposed trajectory of the Narita line which would link Tokyo's new international airport (Figure 4.20). The very next day, led by their mayor, the residents of Edogawa and Koto districts in the city of Chiba (Chiba) launched a protest citing the potentially harmful effects of the high-speed train on the environment and on theirlands which bordered the proposed rail route (Japan Times, 10 February 1972: 2).

In this case, after spirited battles, in which they were supported by left-wing parties such as Ryokichi Minobe (1904-1984), the socialist governor of Tokyo (1967-1979) and other groups opposed to the new airport, the residents prevailed. In the spring of 1974, the Minister of Transport ordered the concerned public corporations to take environmental factors into account and consult the local communities before finalizing the trajectories of new Shinkansen lines. He thus managed to backtrack with honor intact and cancelled the proposed line. A decision substantiated by the moratorium slapped on further expansion of the network by the Cabinet and the refusal of many to sell their land for the Shinkansen.

Of far greater importance were the protest movements launched by the citizens of Nagoya which attracted national attention. By the means of well-orchestrated efforts, they fought for many years a battle against the National Railways both by holding public demonstrations as well as taking recourse to the judiciary system [1].

1. For a more detailed account regarding this protest movements, please refer to: "Biting the Bullet: The Politics of Grass-Roots Protest in Contemporary Japan" a thesis by David Groth (1987).

Figure 4.20: ROAD PROJECT FOR THE NARITA LINE



Scale 1: 1 100 000

[2] In the beginning of the 1970s, in response to these grievances aired by the citizens of Nagoya and Hamamatsu (Shizuoka), the Environment Agency submitted some recommendations to the Transport Ministry and the two public corporations to remedy the pollution caused by the Shinkansen.

Following a meeting of the concerned parties in October 1972, the Central Council for Pollution Control Measures, an advisory body of the Agency, adopted certain norms which would limit the noise caused by the train to 80 dB (A) and asked the National Railways to take the necessary steps to implement them. At the same time, keeping the greater interests of the pro-Shinkansen lobbies and the nation in mind, this recommendation was a compromise and only a diluted version of the more stringent norms demanded. It went against its own Committee on Sound Pollution created by the Shinkansen which had determined a maximum limit of 65 dB (A) as well as suggested a reduction in speed in some urban areas. This last was completely rejected on the grounds that it would negate the very purpose of the high-speed train (Japan Times, 20 December 1972: 2).

In the following years, the Agency attempted to accelerate this process of reducing the Shinkansen's harmful effects by pressurizing the Cabinet and the public corporations. In response, they replied that despite their willingness, due to a lack of finances and technical know-how, they could not completely eradicate the problems. Still, in conformity with two recommendations of the Agency, one concerning the noise level (July 1975) and the other dealing with the vibrations (March 1976), both of which were legalized in 1976 by the means of the *Basic Law for Environmental Pollution Control* (1967), the National Railways invested several million yen in an effort to reduce, over a period of ten years, the environmental problems caused by the network.

A few months earlier (March 1974), dissatisfied by the progress made, 575 households of Nagoya close to the Tokaido line, filed a suit in the district court against the National Railways. Citing the social and medical problems caused by the railway, this Group for Environmental Justice regarding the Shinkansen wanted the noise limit to be set at 65 dB (A) as well as a reduction in the vibrations caused by the passage of trains. It also demanded that an injunction limit the speed of the train from 210 to 65 km/h in some urban zones. Finally, an indemnity of ¥1 million per family was to be granted as compensation for the harm caused (Japan Times, 31 March 1974: 2).

On 11 September 1980, the Nagoya Court rejected the request for reducing the speed of the train. In his statement, the judge pointed out that granting this request would have more damaging consequences for the nation than the inconveniences cited

by the[2] residents. Nevertheless, he awarded them ¥530 million as compensation (Japan Times, 12 September 1980: 1).

Dissatisfied, the Group appealed to the High Court. On 12 April 1985, the High Court of Nagoya upheld the arguments and judgment passed 5 years previously. It too concurred on the payment of idemnities to the affected families (Japan Times, 31 March 1974: 2).

This long court battle was finally settled in 1986. The Association obtained from the Court an injunction which stated that JR Central should respect the noise limit of 70 dB (A) set 10 years ago by the Cabinet and awarded ¥480 million as compensation. But, as of 1991, despite all the Railway company's efforts, the noise level still did not confirm to the norms set (Japan Times, 17 December 1991: 4).

Notwithstanding the human factors, and taken solely as a system, the sentiments of societal agents is very positive. In comparison to the tepid reactions to the National Railways, the Shinkansen enjoyed great popularity. Not surprising, knowing that about a third of the revenues from passenger transport was generated by this symbol of the nation's technological prowess.

By and large, the high-speed train was much better received by the Japanese people than the other services offered by the national enterprise. Five principal factors which recur regularly explain this "*love story*":

- The Japanese are proud of the network. A ground-breaking achievement, the Shinkansen is a window to the world on Japanese know-how.
- from the technological point of view, the network is a model of perfection and innovation.
- in contrast to the rest of the public rail network, the Shinkansen generates profits. It is not a financial burden on the state.
- The Shinkansen has proved its efficiency. The people appreciate its speed and accessibility.
- Safe. Since it was put into service, the Shinkansen has never had a major accident which caused any fatality.

An article which appeared in the *Japan Times* more than a year before the inauguration of the Tokaido line already radiated the pride which still burns bright today.

> In one aspect, the National Railways represent a brilliant success. The superexpress train [...] will be a proud symbol of success for the Japanese National Railways.
>
> [...]
>
> It's technological features have much impressed foreign visitors at the time of a recent ECAFE [Economic Commission for Asia and the Far East] session in Tokyo and the magnitude of success now shaping up is said to have shattered the concept of railways as an obsolescent means of transportation (Japan Times, 15 June 1963: 12).
>
> The new Tokaido Trunk Line [...] is a dream of every Japanese (Japan Times, 8 July 1963).

Having said that, it must also be noted that it was not so during the course of the study period. Despite the image of technological perfection projected abroad, the Shinkansen network saw its fair share of problems, as is shown by an article in the *Japan Times*:

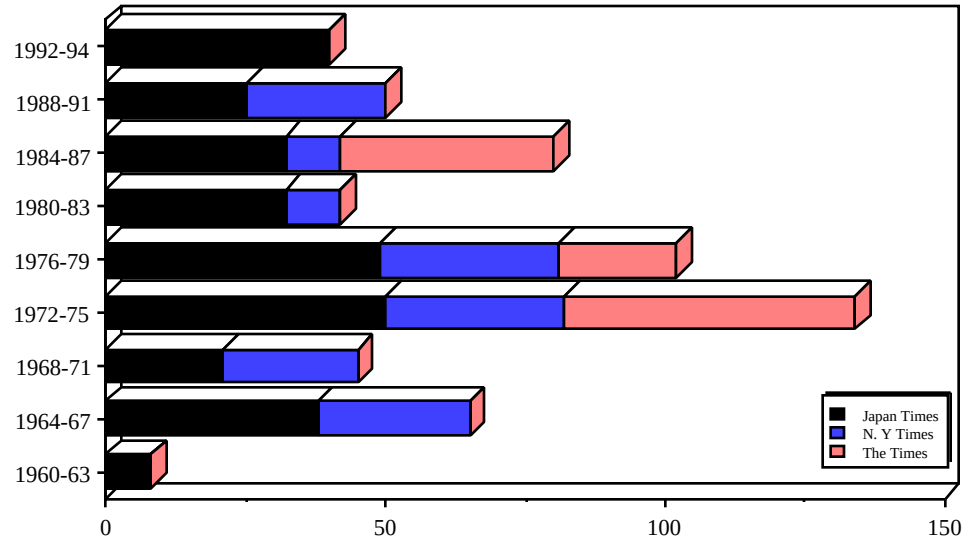
> The Shinkansen, the high-speed "bullet train" system enjoys a high reputation abroad as a symbol of the advanced technology of the nation, although its image at home has been somewhat tarnished by host of social problems it has created being a source of noxious noise pollution, its vulnerability to snowfall, etc (Japan Times, 1 January 1977: 2).

Varying over time, opinion towards the Shinkansen hit its lowest point during the turbulent 1970s – years which saw major clashes between those at the helm of JNR and its workers, politico-financial scandals involving the management of the program and a plague of technical glitches (Figure 4.21). All in stark contrast to the first years of operation of the Tokaido line.

Privatization reversed this negative trend. The years 1988-1994 saw an increase in the popularity of the network. In the public eye, the benefits of this major reform were considerable. The creation of the JR Group meant that the excellence of the Shinkansen service would now be extended to the whole of the conventional railway network.

As the foreign media were generally interested only in dramatic events taking place on the international scene, such as speed records, delays due to snow-storms, an earthquake, a technical fault or a strike, it is not surprising to see the trends emerging in the *New York Times* and the *Times*. The American daily paints an extremely rosy picture (80.6%) of the Shinkansen, and holds it out as the model to be followed by American railroad companies (Figure 4.18).

Figure 4.21: SHARE OF THE COMMENTS UNFAVORABLE TO THE SHINKANSEN NETWORK (1960-1994)



Sources: Japan Times, New York Times and The Times. 1960-1994

At the same time, the British had a tendency to portray a more negative picture (25.5%) by dwelling on the problems faced by the high-speed train and highlighting the managereal difficulties of JNR (Figure 4.19). These results are due more to the newspaper's stress on current events than to any deliberate bias.

4.6 CONCLUSION

This chapter first identified the societal forces which influenced the development of the Shinkansen network and then examined their relations, ambitions and expectations regarding the high-speed train. In the context of the nation as a whole, the Shinkansen network had been proposed as the answer to justified needs. In spite of these legitimate aims, over the course of years, due to the type of management adopted for this network, the high-speed train also became a greatly desired object for the political apparatus.

The majority of the projects regarding new lines originated from valid motives concerning land management and the regional economic development. Still, the analysis of content has brought to light the presence of certain societal forces which used their power to influence the course of the program to suit their particular interests and the Japanese geography. On many occasions, politics have distorted the scientific aims behind the extension of the network to suit their own subjective and electoral needs.

CHAPTER 5

THE SHINKANSEN NETWORK AND THE LAND MANAGEMENT AND THE REGIONAL ECONOMIC DEVELOPMENT

The preceding chapters have shed some light on the reasons behind the development of the high-speed rail network. The Japanese government had had to adopt certain policies and agenda in order to address the socio-economic and geographic problems of the country. This final section will serve to verify whether the Shinkansen network met the aims for which it was created.

By the means of the variables introduced in Chapter 2, the basic aim of this exercise is to measure the effect generated by the construction of the rail-corridors Tokyo-Fukuoka, Tokyo-Morioka and Tokyo-Niigata on Japan. These lines were the main arteries of the high-speed national network to which were added the future regional sections.

In this chapter, the author proposes to measure, with the help of government statistics, the influence of the first 1,832 km of rail of this comprehensive program and analyze the changes brought about by the high-speed train on the geography and certain aspects of the socio-economic life of the archipelago (Japan. Japanese National Railways, 1986: 1 and 13).

Though this study and its conclusions deal primarily with Japan, they can also serve as indicators to foreign rail companies and point at the possible effects on land management and regional economic development that such a transport system may have in their context. At first sight, the results may seem very positive, but they have to be seen in the geographic and socio-economic context of Japan.

The Shinkansen could very well turn out to be a nightmare for a country which does not have the essential criteria which contributed to its success in the land of the Rising Sun. It is not possible to transpose all the indices regarding the spatial influence of a high-speed train from one country to another. On the other hand, despite certain fundamental differences between countries, such as size, population density and passenger habits, there are indicators which may help validate such a rail network. The

author[2] presents here some of the indicators which may help to foresee the success or failure of such a system.

5.1 THE SHINKANSEN NETWORK AND LAND MANAGEMENT

A history of the development of the Shinkansen would not be complete without a statistic profile of some of its activitites which revolutionized the socio-economic and spatial organization of Japan. The development of the network since its inception in 1964, will be measured in terms of three variables: the speed, the clientele and operating revenue.

Anxious to provide to its clients an unparalleled combination of speed and affordability, the National Railways and especially the JR Group, pulled out all stops in a bid to decrease transit times within the Shinkansen network. In an effort to increase profits and maintain their technological advantage, the Japanese rail companies were driven to increase train speeds. The following extract from the *Central Japan Railway Annual Report 1991* is explicit:

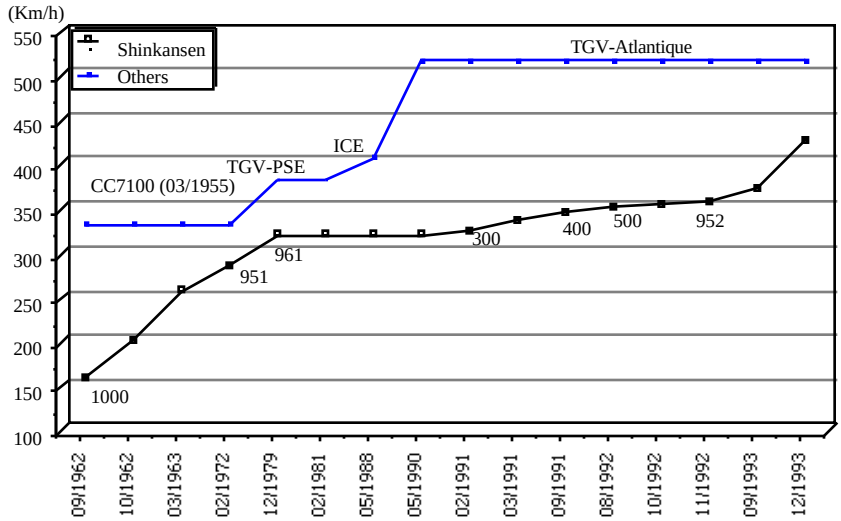
> With time becoming an increasingly precious commodity, society has stepped up its demands for faster transportation. Calls for increased speed pose never-ending challenges for companies operating in the transportation industry, and Central Japan Railway Company is no exception. In order that the Tokaido Shinkansen may continue to contribute to the nation's economy, we must heed the public's demands for speedier service.
>
> The scheduled opening of Kansai International Airport in 1994 and expansion of New Tokyo International Airport (Narita) and Tokyo International Airport (Haneda) will result in greater operating capacity for airlines, thereby increasing the convenience of air travel. A faster Shinkansen, however, will enable us to maintain our competitiveness (Central Japan Railway Company, 1991: 8).

This race against the clock was not to get an entry in the *Guinness Book of World Records* (Figure 5.1). It was, above all, a strategy to attract more passengers. It is not a coincidence that the post-privatization period of JNR saw a slew of new commercial speed records along the Shinkansen lines. This acceleration meant that the high-speed train continued to maintain and increase its revenues and its market share. To cope with ever-increasing demand, transit times had to be minimized in order to increase train frequency and thus swell the number of passengers.

Just when the Japanese were about to break the world record of 331 km/h set on 28 March 1955 by a train (engine CC7100 plus three bogies) of the Société nationale des chemins de fer français (SNCF), it was pushed further back by the Train à grande

vitesse[2] (TGV) which attained 380 km/h (Figure 5.1). Then in May 1988 and 1990, this record was obliterated when the Inter City Express (ICE) of the Deutsche Bundesbahn and the TGV-Atlantique touched new heights with 406.9 and 515.3 km/h respectively (Japan Railway & Transport Review, October 1994: 63)

Figure 5.1: EXPERIMENTAL SPEED RECORDS (JAPAN AND IN THE WORLD), 1955-1994



Sources: ----------. High-Speed Trains Worldwide. Japan Railway & Transport Review: 63-64.
and FOSSETT, D. 2002 Shinkansen National Speed Records.

Over a thirty year period, the top speed attained by the Shinkansen in trial runs went up from 160 to 425 km/h, an improvement of 165.6% (Fossett, 2002). Most of this progress (99.4%) was attained essentially between 1962 and 1979. The 1980s were a period of stagnation, with a null increase. In contrast, in the same decade, the TGV saw a 22.9% increase in speed. This is no doubt explained by the fact that the Railway Technical Research Institute began to divert its attention to a mega-project: the Maglev or magnetically levitated train. On the other hand, the French engineers continued to improve a system which had already been tried and tested technologically as well as economically, and which could be implemented along many points of the French Hexagone.

Between February 1981 and December 1993, the difference in experimental speed records between the Japanese and French public corporations increased from 61 to 90.3 km/h. This in itself shows the effect of the Japanese diversion which channeled all research effort into implementing a new and expensive rail technology instead of trying to improve upon the existing network.

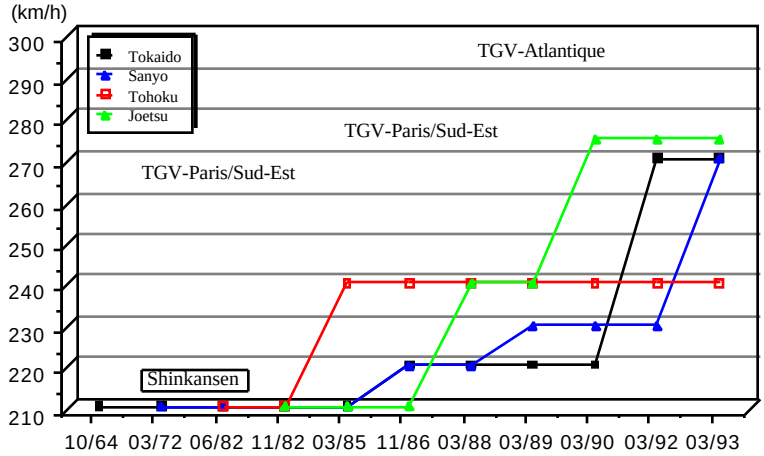
After the carefree times of the National Railways, the directors of the JR Group quickly realized that better trains were needed soon – not for the mere technological

challenge[2], but to generate greater profits in the mid-term. Though these companies had their heart set on the Maglev, they concentrated first on lesser revolutionary solutions to increase the speed of the Shinkansen while reducing the noise and vibrations.

The magnetically levitated train has been proclaimed by its architects as the future of rail travel along the Tokyo-Osaka corridor. It occupied the prime spot in the Tranport Ministry's policies adopted in the late 1980s for laying the infrastructure of high-speed rail travel in the 21st Century. Though it fit in well with the socio-economic conditions of this main line outside the megalopolis, a better alternative would have been to improve upon the traditional high-speed rail technology and thereby extend the Shinkansen network.

Nevertheless, for almost twenty years, no other rail line had succeeded to grab as many world commercial speed records as had the Shinkansen (Figure 5.2). More practical than the Europeans because of the market conditions of rail transport in the archipelago, the Japanese were almost forced into becoming world leaders in commercial operation of a railroad. Still, on 27 September 1981, the French Train à grande vitesse pulverized this record when the TGV-Atlantique was put into service with a top speed nearing 260 km/h. It thus regained the top spot which had been lost by the Mistral.

Figure 5.2: COMMERCIAL SPEED RECORDS ON SHINKANSEN AND TGV NETWORKS, 1964-1994



Source: JR Group.

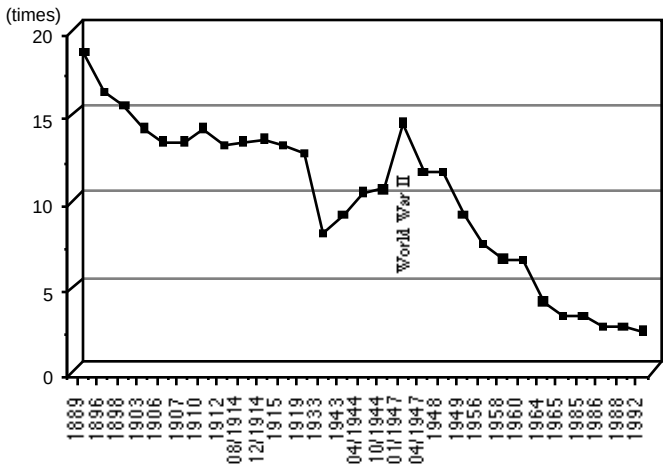
Though in 1992 the TGV-Atlantique et Paris/Sud-Est were plying regularly at top speeds of 270 to 300 km/h, operationally speaking, there appear only modest differences between the Japanese and French technologies. The fastest commercial lines in Japan were those of the Shinkansen model 200, in service in Asahi on the Joetsu line. Since March 1990, it attained a very respectable cruising speed of 275 km/h. The Shinkansen model 300, in service in Nozomi on the Tokaido and Sanyo lines from

1 March 1992 and on the Osaka-Fukuoka section since 18 March 1993, went up to 270 km/h. The other models, the 0, 100 and 200 had top speeds between 220 and 240 km/h.

Since 1964, the high-speed train has revolutionized travel in the archipelago. Thanks to the Shinkansen, a businessman living in Niigata, Morioka, Osaka or Yamagata can easily do business in the Capital and get back home the same evening. Just by that very fact, the high-speed train also saves him hotel bills and reduces his food expenses. For the ordinary citizen and business this constitutes a significant economic saving.

Whilst in the era of the steam locomotive at the beginning of the 20th Century, it took fourteen hours and five minutes to travel from Tokyo to Osaka, in 1992, the Nozomi Shinkansen could traverse the same distance in two hours thirty minutes (Figure 5.3).

Figure 5.3: TRAVEL TIME BETWEEN TOKYO AND OSAKA, 1889-1992



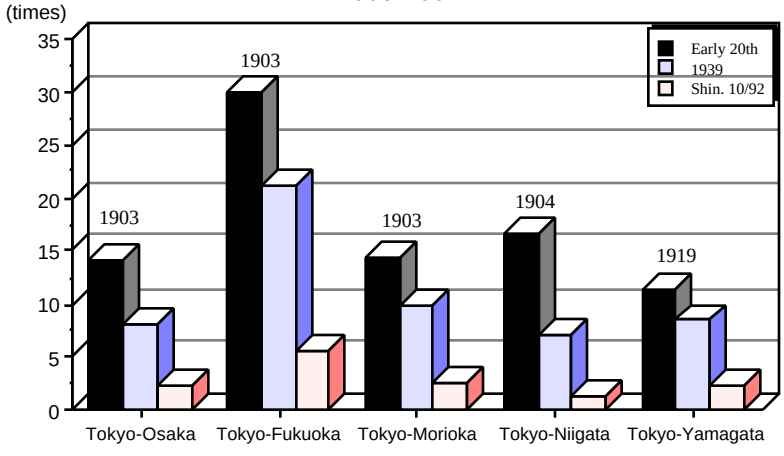
Sources: Timetables of Japanese National Railways and JR Group.

Every new addition to the network reached a greater and greater portion of the Japanese population, reducing transit times and extending the boundaries of "a day's journey". Psychologically too, it reduced the the fatigue caused by long journeys as well as the time spent commuting to work or to recreational spots. In this regard, the progress achieved in cutting travel times between the national capital and the terminal points of the network is truly impressive. In the years 1900 and 1910, it took about 11:40 hours from Yamagata, 16:50 hours from Niigata, 14:47 hours from Morioka and 30 hours from Fukuoka to reach Tokyo.

In 1992, the Shinkansen made it possible to complete a return trip within 24 hours to regions once thought to be far-off. Figure 5.4 shows that with the exception of the

residents[2] of Fukuoka, who still needed 5:41 hours, the majority of the people living close to the high-speed rail network, could get to the national capital in 2:36 hours or less.

Figure 5.4: TRAVEL TIME BETWEEN NETWORK TERMINATION POINTS, 1903-1992



Sources: Timetables of Japanese National Railways and JR Group.

With the arrival of the Shinkansen, people and businesses outside the metropolitan area of Tokyo, shackled at one time by the time taken, could also now benefit from this region's economic growth. In keeping with the government's objectives, the establishment of this network was an important step in reducing travel times as well as facilitating domestic travel.

Psychologically too, the Shinkansen helped to bring about a socio-economic unification of the nation by bringing individuals and institutions closer together. During the period 1903-1992, space/time collapse between -0.1024 to -0.2763 hour/year for the region served by the Shinkansen (Table 5.1). Since October 1964, the area covered in a day's journey has expanded greatly as is shown in Figure 5.5.

When the construction of the new Tokaido line was announced, there were many who had doubts about its success. But, within a few weeks of the network's inauguration, they were all dissipated. The enormous popularity of the Shinkansen justified the move by the directors of the National Railways to revive a technology which had been dismissed by the proponents of the airplane and the automobile as obsolete in this atomic age.

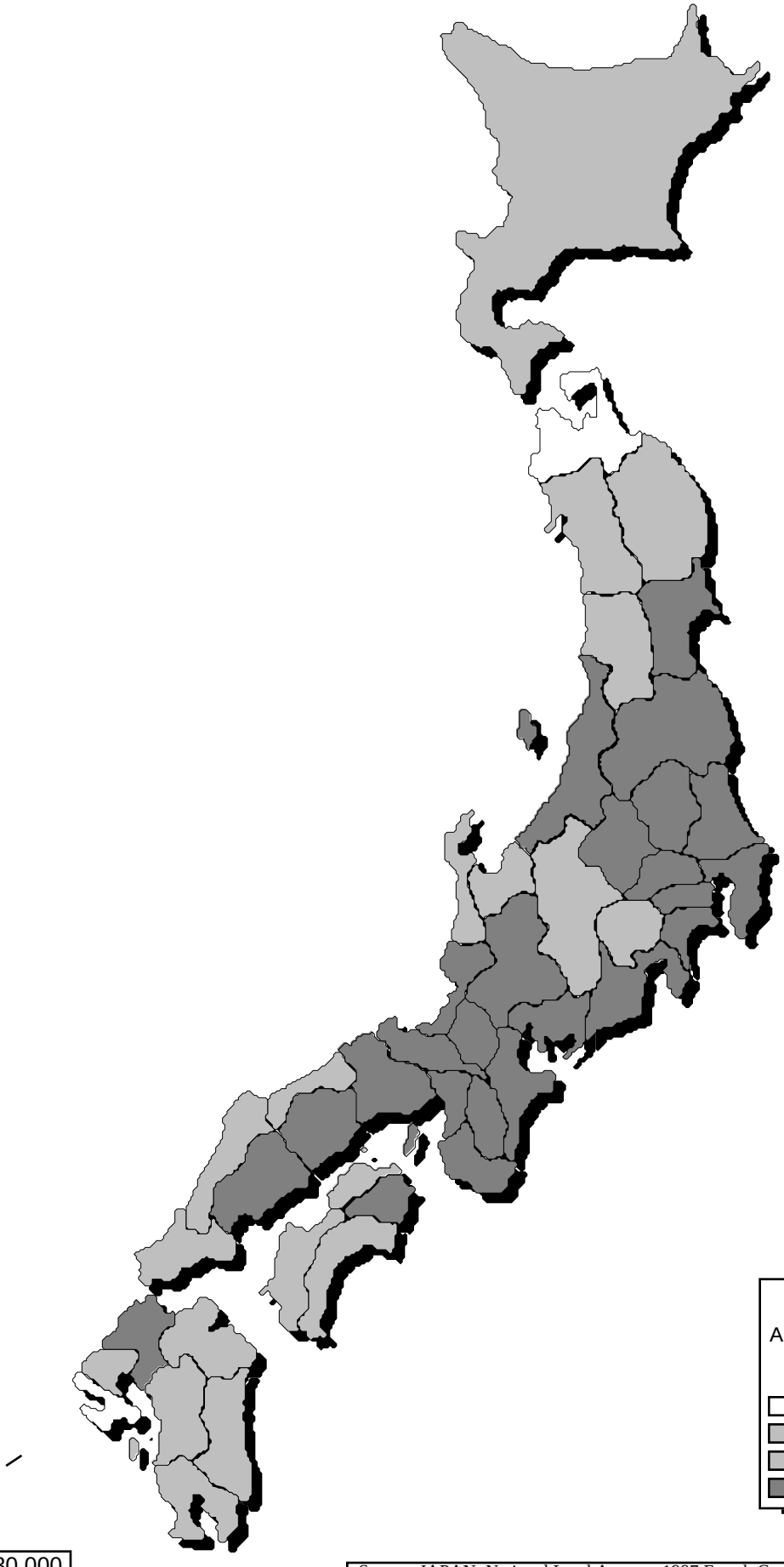


Figure 5.5: TRENDS IN ONE-DAY ACCESSIBILITY POPULATION (1985)

- 0% to 7%
- 8% to 15%
- 16% to 30%
- 31% to 50%

Scale 1: 8 330 000

Source: JAPAN. National Land Agency. 1987 Fourth Comprehensive National Development Plan. p. 167.

[2]

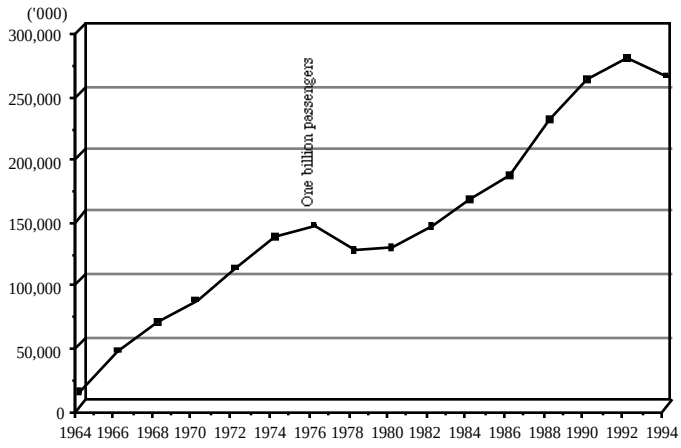
Table 5.1: Space Time Collapse [2]

From Tokyo to	Travel Time 1903	Travel Time 1992	Hours / year
Fukuoka	30:00	5:41	- 0.2763
Niigata	16:50	1:40	- 0.1697
Osaka	14:05	2:30	- 0,1320
Morioka	14:47	2:36	- 0.1361
Yamagata	11:40	2:29	- 0.1024

Sources: Timetables of Japanese National Railways and JR Group.

Because of its indisputable advantages, the high-speed train has been used by some three billion passengers since its inauguration (Figure 5.6). From its second year of operations, 110 trains with six coaches each, transporting on an average some 84,841 passengers, shuttle between Tokyo and Osaka every day (Japan. Japanese National Railways, 1986: 5). In 1968, to cope with rising demand and in anticipation of the World Exposition of 1970 (Osaka), JNR announced that it would undertake a major construction project to lengthen the platforms at Shinkansen stations to accommodate trains with sixteen coaches, which were then already in the trial stage (Japan Times, 27 August 1968: 3). As the world's longest electric train, this extended Shinkansen entered service in December 1969. Two months later, all the trains in the Hikari sector were also transformed to this new configuration.

Figure 5.6: NUMBER OF PASSENGERS CARRIED ON THE SHINKANSEN NETWORK, 1964-1994



Sources: JAPAN. JAPANESE NATIONAL RAILWAYS. 1986 Shinkansen. p. 5-6.
and JAPAN. Ministry of Transport. 1996 National Transportation Statistics Handbook 1995. p. 50.

2. To calculate the Space / Time Collapse, we used the following mathematic formula:
STC = [Δ TT / Δ T]
where: **STC**: Space / Time Collapse, **TT**: Travel Time, **T**: Time.

Twenty-seven years later, thanks to the increased capacity, 288 trains ferry on an average 367,000 passengers on a daily basis over the Tokaido. During peak times, such as New Year's Day, the number is increased to its maximum with 312 departures. The Tokyo-Osaka line is by far the busiest. Every year it accounts for around 75% of the total traffic over the Shinkansen.

The number of passengers increased (Figure 5.6) with the rise in the Gross National Product and higher living standards of the Japanese which enlarged the population base having the financial resources to travel on this system (Figure 3.1). Thus, with the exception of the years immediately following the oil crunch of 1973, the network saw a steady growth in popularity. In 1982, the inauguration of the Tohoku and Joetsu lines accelerated this trend.

To this day the network continues to lure more and more passengers, especially over medium distances. Its success is due to the fact that it brings together all the advantages offered separately by the other transport systems. The Shinkansen lets you travel with the comfort, speed and cost comparable to the airplane in complete, unequalled safety.

If we consider the following four indicators: 1) fare; 2) travel times; 3) departure frequency and 4) available seats, it is evident that the Shinkansen commands an almost complete advantage over its competition. (Figures 5.7).

Comparative data shows that the only true contender of the high-speed train is the airplane. The automobile is hopelessly outclassed from every point of view. As for the bus, excepting its low fares (Figure 5.7a), it is too slow and, as with conventional trains, has too few daily departures to be convenient.

The popularity of the Shinkansen proves that it is a highly viable mode of transportation. As the public became increasingly more aware of the advantages in the first six months of operation of the Tokaido line, the national carriers, Japan Airlines registered a huge dip of 50 percent in its clientele on this route (New York Times, 14 March 1965: 21). The same story was repeated when the Sanyo, Tohoku and Joetsu lines were added to the network. This choice turns out rational, because the time/ profit ratio demonstrates that the passenger of the high-speed train realizes a good earning which varies from 0.1146 to 0.4127 per hour, for the main railway lines in competition with the air routes on short or medium distances (Table 5.2). On long distance, like on the Tokyo-Fukuoka route, airplane remain a better choice for the traveler compare to the Shinkansen (-0.4884).

[2]

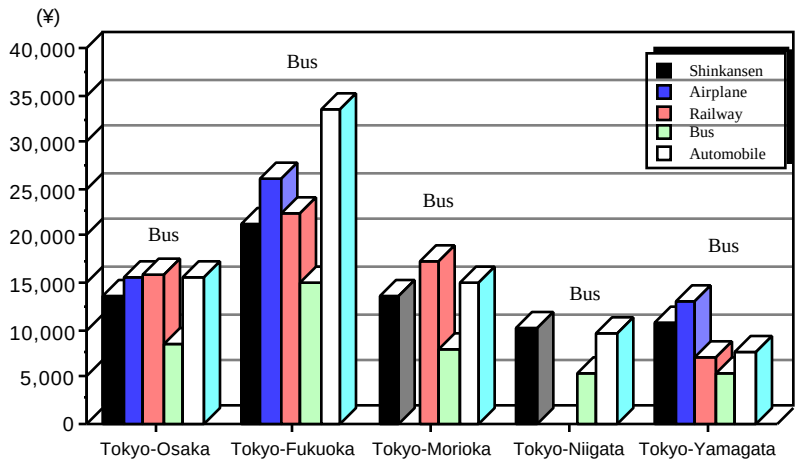
Table 5.2
Time/Profit Ratio between
three Shinkansen and Airlines routes (October 1992) [3]

Route	Service	Travel time	Fare (¥)	Time/Profit (¥/h)
Tokyo-Osaka	Nozomi	2:30	14,430	0.1146
	Airplane	2:41	15,390	--
Tokyo-Fukuoka	Nozomi / Hikari	5:41	21,300	- 0.4884
	Airplane	3:09	26,050	--
Tokyo-Yamagata	Yamabiko / Tsubasa	2:29	10,810	0.4127
	Airplane	2:51	13,020	--

Sources: Timetables of JR Group and Japan Airlines for October 1992.

Excepting the Tokyo-Fukuoka section, anybody in a hurry has no other option but to take one of the ultra-fast Shinkansen trains (Figure 5.7b). They offer the shortest transit times with unmatched punctuality. In 1991, the average delay on the Tokaido line was 36 seconds [4]. A small number when compared to the time wasted in traffic jams or in congested airports.

Figure 5.7a: FARES BY MODES OF TRANSPORT, October 1992



Note: The base of comparison is the regular rate in economy class from a Shinkansen station to another.

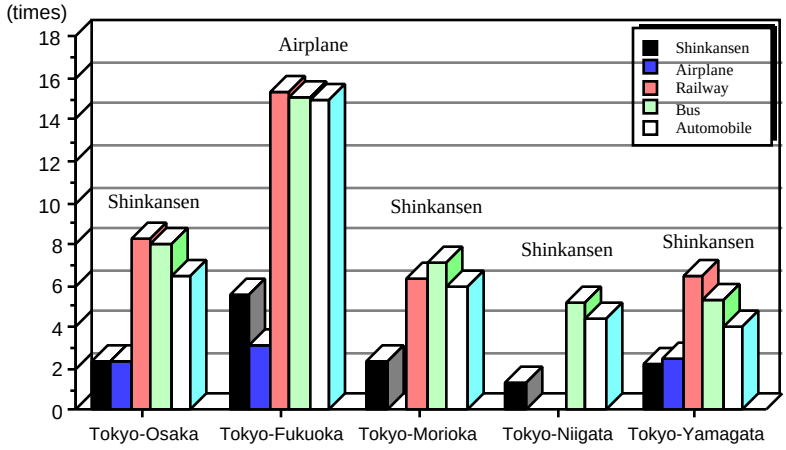
Sources: Timetables of JR Group, All Nippon Airways,
Japan Air System and Japan Airlines for October 1992.

3. To calculate the Time/Profit ratio, we used the following mathematic formula:
TPR = [Δ TT / Δ F]
where: **TPR:** Time/Profit ratio, **TT**: Travel Time, **F**: Fare.

4. Data obtain from JR Central Railway Company.

[2] Over and above its high and unequalled (except to Fukuoka) frequency of departures between the different points of the network, the high-speed train proves to be extremely flexible for its clientele of which 70% travel on business. Located at the center of cities, Shinkansen stations allow an easy access to the socio-economic and financial hearts of these urban agglomerations. This constitutes a major advantage over air travel. Using the Shinkansen saves precious time wasted in traveling to and from airports to the city-centers.

Figure 5.7b: TRAVEL TIME BY MODES OF TRANSPORT, October 1992

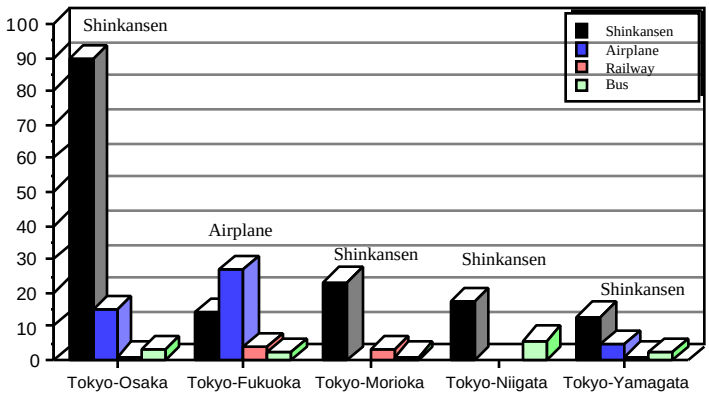


Note: The base of comparaison is the travel time from a Shinkansen station to another.

Sources: Timetables of JR Group, All Nippon Airways,
Japan Air System and Japan Airlines for October 1992.

The frequency of daily departures meant that the passenger had almost the same freedom of movement as the motorist. In 1992, over the whole Shinkansen network, 741 trains plied daily from one point to another with the Tokyo-Osaka sector by itself accounting for 38.9%. The lines of Sanyo, Tohoku and Joetsu counted 215 (29%), 138 (18.6%) and 100 (13.5%) respectively (Japan Railways Group, 1992: 1).

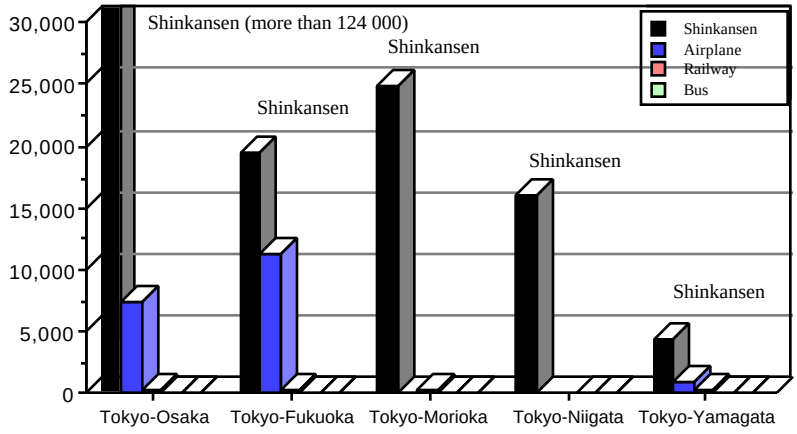
Figure 5.7c: DAILY DEPARTURES BY MODES OF TRANSPORT, October 1992



Note: For the railway, only the departures in ultra-fast service were compiled.

Sources: Timetables of JR Group, All Nippon Airways,
Japan Air System and Japan Airlines for October 1992.

Figure 5.7d: AVAILABLE SEATS BY MODES DE TRANSPORT, October 1992



Note: For the railway, only the available seats in ultra-service were compiled.

Sources: Timetables of JR Group, All Nippon Airways, Japan Air System and Japan Airlines for October 1992.

Added to the high frequency of departures, the large capacity of the trains resulted in the daily availability of a large number of seats over the entire network. More than anything else, this significant advantage pushed the high-speed train far ahead of its competitors. In comparison, the high capacity carriers (i.e. Boeing 747s) of the three air lines servicing the Tokyo-Osaka route could offer only about six percent of the seats available on the Shinkansen.

Table 5.3
Services on the Shinkansen Lines departing from Tokyo Station to terminal points (October 1992)

Lines	Service	Travel Time	Number of departures	Cars by train
Tokaido	*Nozomi*	2:30	2	16
	Hikari	2:49	87	16
	Kodama	4:12	30	16
Sanyo	*Hikari*	5:44	14	6, 12 & 16
	Kodama	(No direct service)		6
Tohoku	*Yamabiko*	2:36	23	12 & 16
	Aoba	(No direct service)		8 & 12
Joetsu	*Asahi*	1:40	17	8 & 12
	Toki	2:22	12	8 & 12
Yamagata	*Tsubasa*	2:27	13	6

Source: Timetable of JR Group for October 1992.

Two types of trains (three types on the Tokaido and Sanyo lines) plied on every Shinkansen line (Table 5.3). The first was the point to point super express which stopped only at major stations. Used mainly by people pressed for time or on long

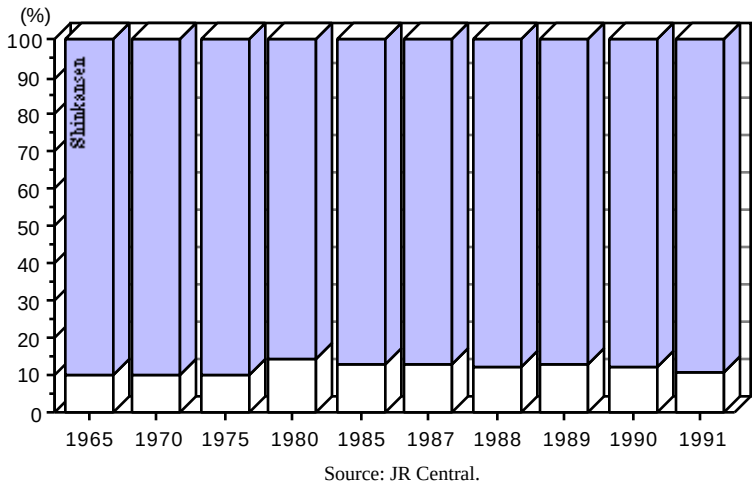
journeys[2], these trains allowed rapid transits between the points provided with this service.

The second type was made up of slower trains which served the local community by stopping at all stations. This service was used mainly by people who had to commute daily to a limited number of stations, between their homes and their places of work or study which were generally situated around Tokyo or Osaka. Compared to the first type, this service had limited options as well as less frequent departures.

The operational statistics reveal the advantages of the high-speed train. It proves to be the ideal means of travel over medium distances. Between 1965 and 1991, the public transport market over the Tokyo-Osaka sector was completely dominated by the Shinkansen (Figure 5.8). The balance going to its biggest rival, the airplane.

Nevertheless, over long distances, the high-speed train is outclassed by the airplane which proves to be the best means of transport. In 1985, Japan Airlines, Japan Air System and All Nippon Airways together accounted for 71% of travel over the Tokyo-Fukuoka sector (Japan. Japan National Railways, 1986: 11). Still, the addition of these two points to the Nozomi train put a dent in this domination.

Figure 5.8: MARKET SHARE OF SHINKANSEN AND AIRPLANE (TOKYO-OSAKA), 1965-1991



Source: JR Central.

Despite being accused of sound pollution and the vibrations caused by its passage, the high-speed train helped significantly in conserving energy as it encouraged public transportation while using electricity, a comparatively less polluting energy source produced at home. Seen thus, the Shinkansen proves to be extremely energy-efficient, using only 28.6% and 22.7% of the fuel required by planes and cars respectively (Central Japan Railway Company, 1992: 17).

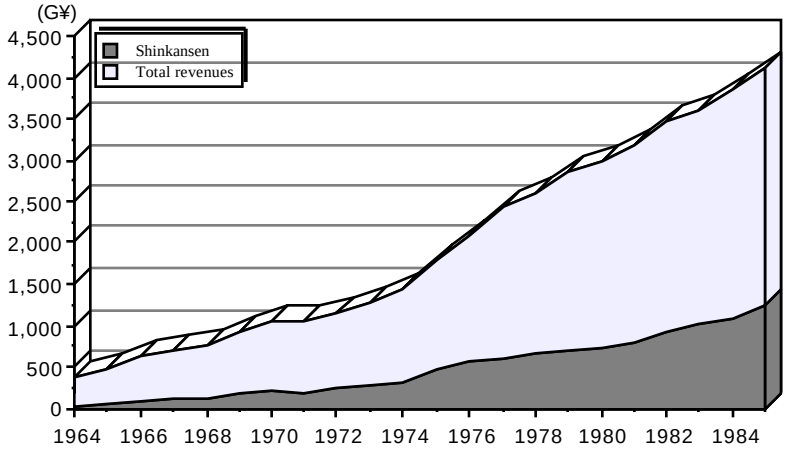
[2] *The 'Golden Egg-laying Hen' of the Japanese Railways*

In contrast to the negative financial results of the National Railways, after 1964, the Shinkansen posted a financial success without peer in the annals of either Japanese or international rail companies. Its contribution to the State's revenue from passenger rail transport went up globally from 13.3% in 1965 to 43% in 1985 (Figure 5.9). This may be explained by the inauguration of the Sanyo, Tohoku, and Joetsu lines and a simultaneous increase in passenger traffic over the whole network (Figure 5.10).

Helped by the high population density and the geography of the archipelago which led to an extensive use of the whole network, this crown jewel of the Japanese national railways has never been in the red, except in 1964 and 1965 (Figure 5.11).

Coupled with these favorable geo-demographic conditions, an exclusive fare scale helped bring in greater revenues. According to this new system, passengers of the Shinkansen have to pay a surcharge, called Super express, over the regular base fare of the conventional trains which is based on the distance to be traveled and the type of rail service. This extra charge, which, depending on the destinations, varied between 30 to 40 percent of the total cost of the ticket, allowed to cash in on the time saved by the passengers while at the same time eliminating the operating losses which were so common on the Japanese rail network. In 1992, this strategy enabled JR East to extract a whopping 24.9% of its total revenues from the Shinkansen despite the fact that the Tohoku and Joetsu lines had transported only 1.2% of the passengers. This was possible because of the reduction in required coaches – a mere 5.3% of its car fleet (East Japan Railway Company, 1992: 12-13).

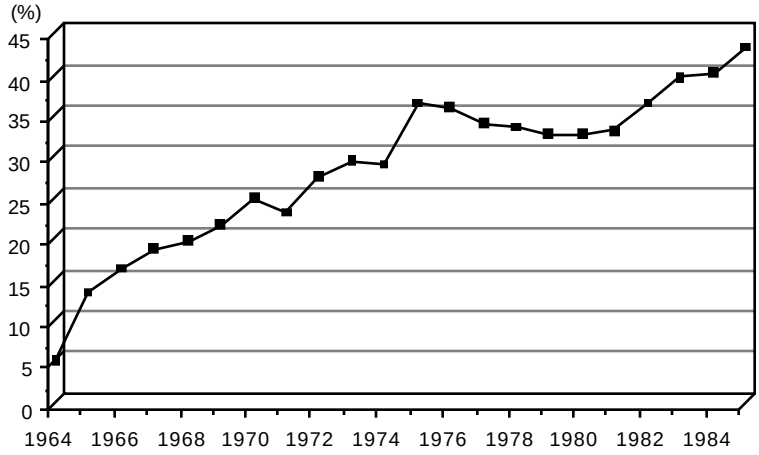
Figure 5.9: REVENUES OF SHINKANSEN NETWORK AND THE JAPANESE NATIONAL RAILWAYS, 1964-1985



Note: Revenues of the Japanese National Railways = Revenues generated by the railway transport of passengers.

Source: JAPAN. Japanese National Railways. 1986 Shinkansen. p. 50.

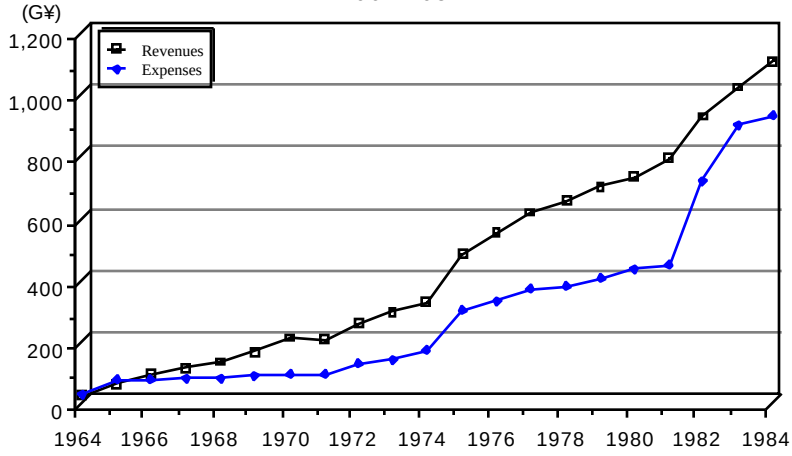
Figure 5.10: SHARE OF THE SHINKANSEN NETWORK IN THE REVENUES OF THE JAPANESE NATIONAL RAILWAYS, 1964-1985



Source: JAPAN. Japanese National Railways. 1986 Shinkansen. p. 50.

In 1983, the National Railways introduced another incentive to their market strategy by the means of the monthly and quarterly passes for adults and students called FREX (Free Express). By costing much less than buying separate tickets everyday, they greatly benefited frequent commuters using a fixed route. For example, a return ticket on the Tokyo-Shin-Yokohama (Kanagawa) route cost ¥2,580, which added up to ¥79,980 for 31 days. A monthly pass costing ¥45,420, allowed a saving of around 76% while the quarterly pass (¥129,460) saved approximately 79.4%.

Figure 5.11: REVENUES AND EXPENSES FOR THE SHINKANSEN NETWORK, 1964-1984



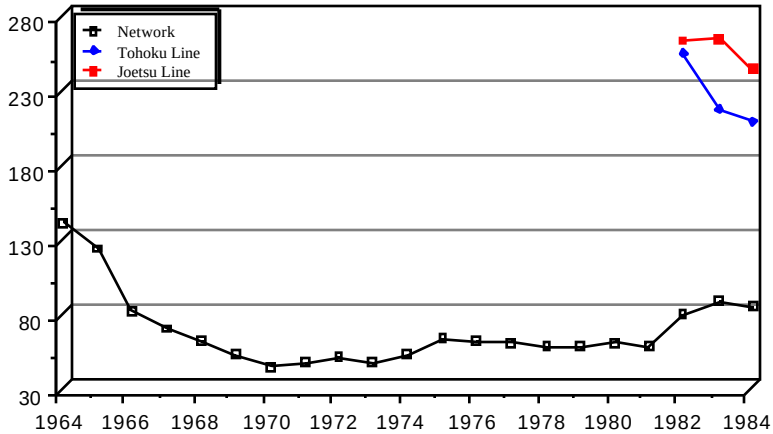
Source: JAPAN. Japanese National Railways. 1986 Shinkansen. p. 50.

The popularity and the customer base of the Tokyo-Osaka corridor explains these positive results. Nevertheless, the opening of new sections contributed to an increase in the operating ratio of the network (Figure 5.12). In the case of the Sanyo line, there was only a meager growth (+14.9) spread over a short time because of the mid-range construction costs of some ¥1.7 billion per kilometer. The situation at the Tohoku and

Joetsu[2] lines was far different. While the Tokaido line cost only ¥737 million per kilometer, the laying of Shinkansen lines in these sectors cost ¥5.6 billion and ¥6.3 billion respectively.

The Japanese government spent many billion yen in the construction of these sections because of two principal reasons. The geomorphology of these regions necessitated several engineering feats. Forty percent of which the Joetsu line had to be laid underground. The Gumma and Niigata prefectures which required the most, also boast of three of the most important tunnels in the entire network: the Dai Shimizu (22.2 km), the Haruna (15.4 km) and the Nakayama (14.9 km). The Dai Shimizu, which cuts through a mountain, is the longest tunnel in the world. To these must be added the construction of hundreds of bridges, several of which were truly impressive. The one straddling Kitakami river (Iwate) on the Tohoku line spanning 3.9 km, is the longest bridge of its kind in the world (East Japan Railway Company: 16). To top it all, in contrast to the Tokaido, which has nary a bridge or tunnel, almost the entire span of the Tohoku and Joetsu lines was built on noise reducing viaducts.

Figure 5.12: RATIO OF OPERATION OF SHINKANSEN NETWORK, 1964-1984



Note: Ratio of operation = Expenses on the revenues. A ratio inferior to 100 = Profit.

Source: JAPAN. Japanese National Railways. 1986 Shinkansen. p. 50.

The work required to construct the rail network in a manner to maximally facilitate the optimal functioning of the train in such difficult terrain, especially true for the Tokyo-Niigata corridor, was gigantic.

In the light of these explanations it is not surprising that these two massive rail projects took more than ten years to complete. Moreover, they took place in trying economic conditions where skyrocketing inflation bloated the cost of construction. Their inauguration increased the operating ratio of the network by 31.5. If we disregard

the Tokaido[2] and Sanyo lines, the ratio of these two lines stayed at over 200 during the first three years of commercial operation.

Extremely high construction costs married to a small though growing client base meant that this figure would take long to trim and profitability would be delayed by several years.

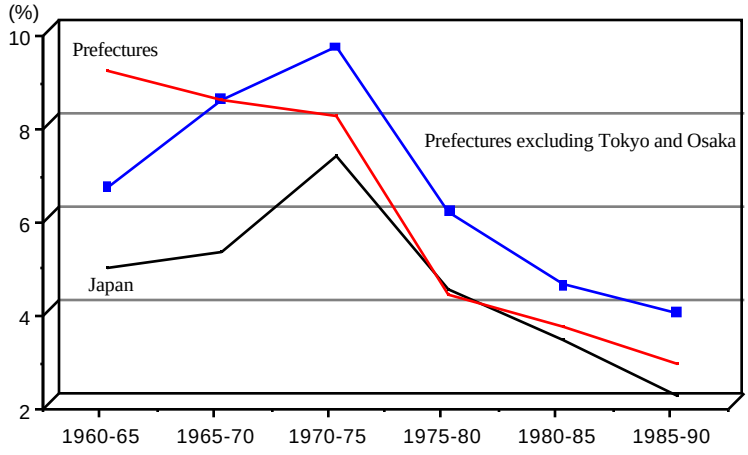
5.1.1 The Shinkansen network and the spatial redistribution of the Japanese population

Since 1960, one of the main objectives of Japanese land management policy was to reverse the migratory trend towards the over-congested megalopolis and bring about a better demographic distribution over the entire archipelago. The Shinkansen network was seen as a means to this end.

The advent of the train was not the only reason behind the surge in the population of a prefecture or a city. Other factors such as the decentralization of industries and the lodgings and construction of the network of highways undertaken in the 1960s also contributed to this growth. It is with this in mind that professor Taniuchi (1984) remarked in his study of the rail network and urban development in Japan:

> It would, however, be too simple to attribute the growth of the centers along the Tokyo-Fukuoka corridor to the commencement of the Shinkansen services, because the Shinkansen system was constructed to cope with the rapidly growing traffic demand caused by the urban and industrial development of the area which was too heavy a burden to be carried by the conventional system (Taniuchi, 1984: 119).

Figure 5.13a: POPULATION GROWTH IN PREFECTURES SERVED BY THE SHINKANSEN, 1960-1990

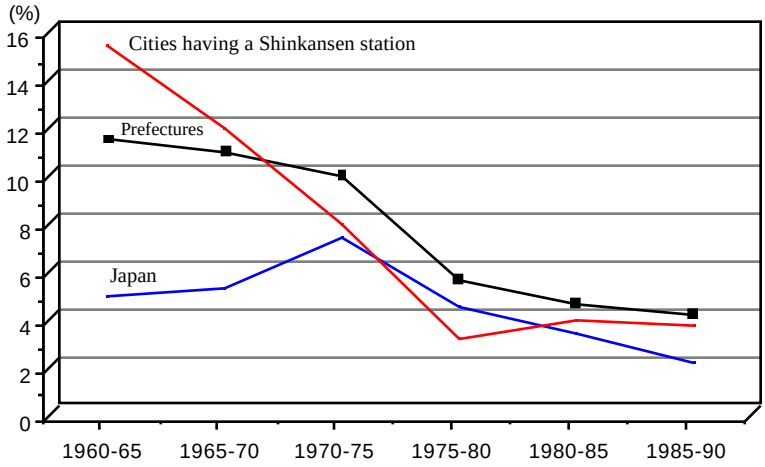


Source: JAPAN. Management and Coordination Agency. 1991 Japan Statistical Yearbook 1991: 26-27.

[2] Still, this variable does indicate to some extent the tendency that this form of transportation could have had on the redistribution of the population. In this context, Figure 5.13a and Appendix 2 shows clearly that prefectures situated along a Shinkansen line experienced a distinctly higher growth in population than the national average. It holds even more true if we exclude the regions of Tokyo and Osaka from the list of prefectures. Between 1965 and 1990, they outstripped these two major agglomerations. The figures seem to indicate that since the 1960s, the network, either installed or planned, helped to slow down the surge of the population towards the traditional zones in favor of emerging urban centers situated in the hinterland.

The four other Figures 5.13 and Appendix 2 show a comparative analysis of the same variable, but this time by isolating the potential effect of each of these lines.

Figure 5.13b: POPULATION GROWTH AROUND THE TOKAIDO LINE, 1960-1990



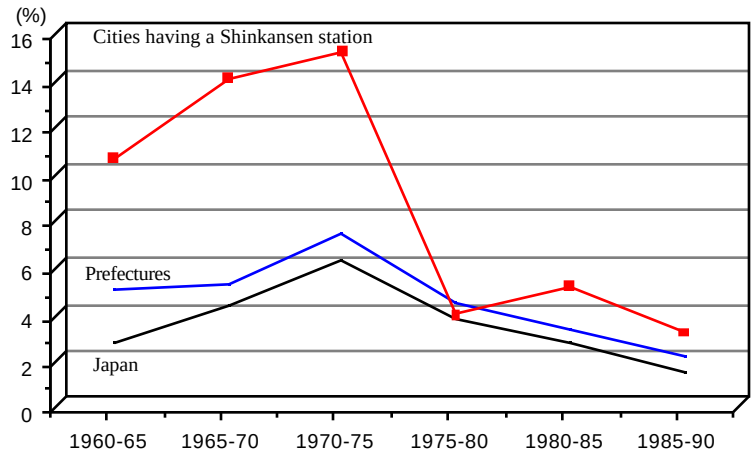
Source: JAPAN. Management and Coordination Agency. 1991
Japan Statistical Yearbook 1991: 26-27 and 30-31.

The influence of the network in relation to the national population growth was measured with the help of two factors: prefectures and cities having a Shinkansen station. Such an approach should help us understand the growth of this mode of transportation in order to know whether its impact was limited to the immediate surroundings of a station or whether it spread over the entire region. These data will then be placed in the context of the national population.

While the Tokaido and the Sanyo lines facilitated a better circulation and a more balanced distribution of the population within the megalopolis, it seems that the regional sections of the high-speed train (Tohoku and Joetsu) led to the decentralization of the population towards the emerging urban centers in other prefectures. Still, these data by themselves are not enough to prove whether this move also led to the

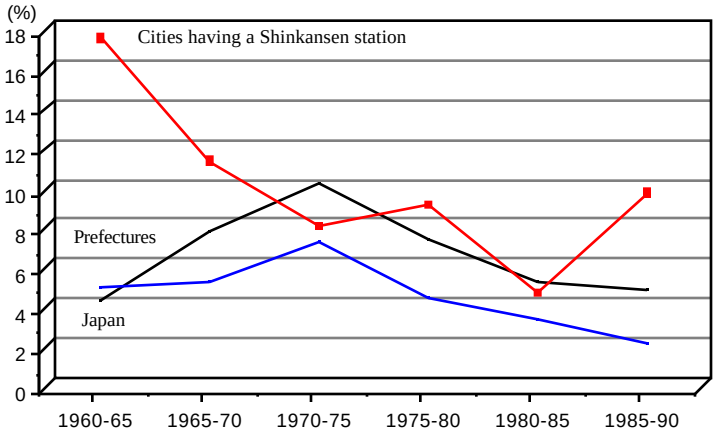
decentralization[2] of the socio-economic activities towards the hinterland. The observed trends though seem to suggest that the emerging regional centers have begun to fulfil a small number of the functions which had been hitherto concentrated in the metropolis.

Figure 5.13c: POPULATION GROWTH AROUND THE SANYO LINE, 1960-1990



Source: JAPAN. Management and Coordination Agency. 1991
Japan Statistical Yearbook 1991: 26-27 and 30-31.

Figure 5.13d: POPULATION GROWTH AROUND THE TOHOKU LINE, 1960-1990



Source: JAPAN. Management and Coordination Agency. 1991
Japan Statistical Yearbook 1991: 26-27 and 30-31.

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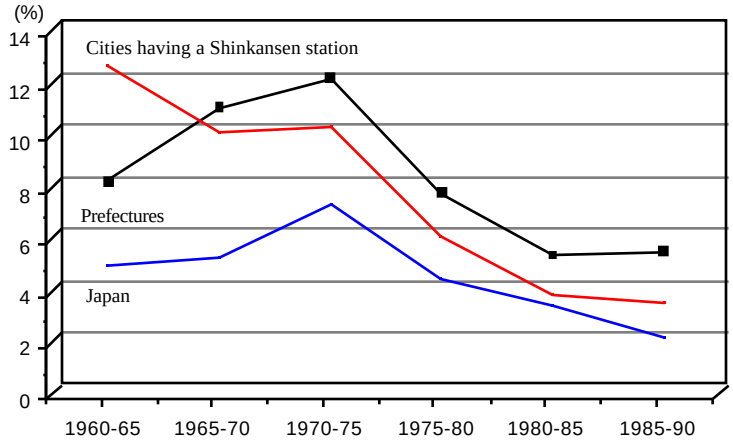
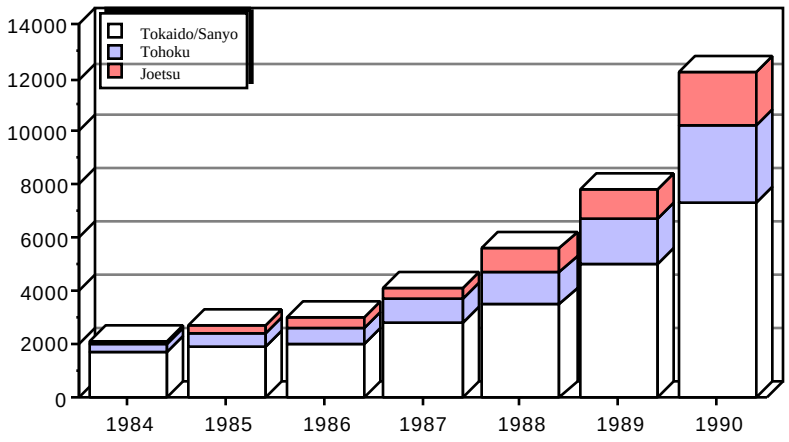
Figure 5.13e: POPULATION GROWTH AROUND THE JOETSU LINE, 1960-1990



Source: JAPAN. Management and Coordination Agency. 1991
Japan Statistical Yearbook 1991: 26-27 and 30-31.

Figure 5.14, which illustrates the rapid growth of alternating migrations, indicates this. The curve shows that despite the fact that a greater portion of the population lives outside the three large urban centers of the archipelago, a growing number of citizens have to travel over long distances for work or study. This phenomenon was accentuated by the projects of urban development close to the network initiated by the real estate subsidiaries of some the railroad companies of the JR Group.

Figure 5.14: HOLDERS OF A FREX SEASONAL PASS, 1984-1990



Source: JAPAN. Ministry of Transport. 1992 Annual Report on the Transport Economy: Summary (Fiscal 1991): 34.

The layout of the main lines of the high-speed train as well as the movements described above show that, to the extent that access to Tokyo was facilitated for the people living close to a Shinkansen station, it still attracted, via this channel, people from the hinterland.

[2] Excepting the Tokaido line, the data prove that cities with a Shinkansen station experienced a more rapid population growth than the other parts of the prefecture.

At the most, the agglomerations around Shinkansen stations have shared the population crunch which hitherto had been directed almost entirely towards Tokyo and Osaka. The geographer Taniuchi came to the following conclusion:

> The major finding of this study suggests that the railway network rather stimulated and reinforced the metropolitan dominance and the growth of the centers along the newly opened lines. If we are allowed to extend the definitions of a metropolis and main spine, to take into account of the more rapid growth of the regional centers than the three metropolitan areas after the mid-1970s and the development of the new transport networks of super highways, Shinkansen lines and air services after the 1960s, the basic trend will not change in the near future (Taniuchi: 121).

In order to prevent the population growth and socio-economic development from confining themselves to regional centers linked by the Shinkansen, major investments had to be made to reach out to the smaller communities and link them to the station-cities by the means of short, quick rail connections. It is to this end that the Transport Ministry hoped to direct its efforts in the coming years and thus to reduce regional desolation (Japan. Ministry of Transport, 1991: 5 and Japan. Ministry of Transport, 1992: 22-26). It aimed at reducing transfer times between the conventional and high-speed train stations by improving the transportation system connecting them. This proved to be a laborious task due to the difference in line gauge. Some steps were taken in this direction by the creation of the railway development fund and the establishment of the mini-Shinkansen.

5.1.2 Land price

One of the greatest benefits of the Shinkansen was that it brought the urban centers of the archipelago closer together and thus facilitated interregional exchanges while relieving the massive urban agglomerations of some of their population crunch. On the other hand, the inauguration of these rail lines also had an opposite effect: it led to a surge in land prices. In this regard, the Shinkansen helped to spread a problem which had assumed almost unrealistic proportions: the buying of land anywhere near the center of the Tokyo metropolitan area.

This phenomenon also holds true for the peripheral towns which had now become, because of the Shinkansen, rapidly growing dormitory-cities. A function which added to their role as regional centers. Utsunomiya (Tochigi), situated less than an hour from the capital became a victim of its own popularity. In 1990, amongst all the

47 prefectural[2] main towns, it registered the highest growth in the consumer price index. One of the chief reasons behind this growth was the explosion in the cost of accommodations. Between 1985 and 1990, it increased by a whopping 27.4% as compared to the national average of 14.2% (Japan Times Weekly International Edition, 4-10 March 1991: 2).

Property developers, greedy for some quick money and often connected to influential politicians, did not hesitate to grab hundreds of hectares of land in isolated, often in remote areas as soon as they came to know that the Shinkansen would pass that way. The most striking example of this came about during the weeks following the publication of Kakuei Tanaka's agenda. In December 1972, the Japan Real Estate Institute revealed that within a period of six months, land prices had shot up on the average by eight percent over the entire territory of Japan (Japan Times, 15 December 1972: 2). The highest growth rates were seen in the countryside which had been specially selected for the high-speed network's expansion. They experienced greater price hikes than even those in the major urban agglomerations.

Another instance where politics and land speculation combined to the detriment of public interest, was the battle for situating the test site of the Maglev. In 1990, after an intense campaign, Shin Kanemaru (1914-1996), Member of Parliament and leader of the powerful Takeshita faction within the Liberal Democratic Party won for his prefecture of Yamanashi the contract for the installation of an experimental 42.8 km line. This made him a hero in the eyes of his constituents, but in reality, only a handful of individuals made off with most of the benefits.

> The top prize is likely to go to a small group of businessman and politicians who bought into a country club in Sakaigawa, a village south of Kofu that is to be the end of the line for the test track. The happy band of investors is said to include Mr Kanemaru and his protégé, a former prime minister, Mr Noboru Takeshita. Second prize goes to those who own 50 acres of marshland, which is to be made fit for building on with the help of soil excavated from the test-track's tunnels. Land in the neighborhood that a few years ago cost $5 a square foot is now selling for more than $50. Soon, say grinning farmers, it will be worth $500 (The Economist, 16 June 1990: 68).

5.1.3 Shinkansen stations: centers of regional development

Since its inauguration, the Shinkansen had major repercussions on the travel habits of the Japanese. At the same time, it also helped in the regional development of districts which at one time had little socio-economic value for developers, consumers and potential residents who found them to be too remote from the main centers of

activity[2] in the megalopolis. The planners had thought that bit by bit, with the extension of the network, these disbalances within the archipelago would even out by the birth of regional service centers which would help the hinterland to integrate itself and participate in a vast, pan-national network of interchange. Such a move was proposed in the Plan for the global development of the nation's territory of 1969. The objective was to spread the existing prosperity which lay confined to the capital and its environs while at the same time to create for the Japanese havens which promised improved standards of living.

Without doubt, the construction of the network led to the decentralization of activities which had been, over the years, concentrated in the three major cities of the country by nurturing the development of intermediate nodes. Gradually, this multipolar ensemble contributed to the formation of a second, large commercial and residential artery.

Still, this process limited itself to a linear distribution of socio-economic activities around the main Shinkansen lines. Excepting a very limited number of cases, small communities distant from the station-towns were hardly touched by this new infrastructure. In this regard, the high-speed train reorganized the exchanges between the major centers of the megalopolis and the peripheral regions. It introduced better balanced and suitably shared relations between medium-sized agglomerations which then were made to act as intermediaries between their zones of influence and the three *elder sisters*. Nevertheless, these relations were always subject to controls exerted by the traditional decision-making centers. For example, several departmental stores set up near regional stations were branch offices with their headquarters located in Tokyo or Osaka (e.g. Seibu, Takashimaya, Daimaru) while American-style fast food restaurants (e.g. McDonald's, Mister Donut, Dunkin' Donuts) dominated the market.

From a more regional perspective, the construction of these stations had a marked effect on the locality. The vehemence of political bickering which surrounded their location clearly shows their importance, especially in areas outside Tokyo and Osaka.

As a major center and wellspring of regional development, such a railway station generated and supported important socio-economic activities within its immediate surroundings.

In many established city-centers, the arrival of a Shinkansen station initiated a process of intense urbanization in the immediate vicinity. The addition of the high-speed train service to a conventional railway station led to major modifications of the

commercial environment, as may be seen most clearly in the case of Okayama, Omiya (Saitama) and Morioka. The small specialist boutiques which had for so long dominated their environs, gradually gave way to multifunction complexes owned by Japanese conglomerates.

At other places, the high-speed railway stations supported the growth of existing businesses as is evidenced by the rapid development of the seaside resorts along the Tohoku and Joetsu lines. Just as in the preceding case, it was the private promoters, backed by political clout, who proved to be the major real estate developers. The privatization of the National Railways gave rise to another major player regarding land management within and around Shinkansen stations. The subsidiary corporations of the JR Group embarked upon an aggressive diversification program, especially into the lucrative market of consumer services. JR Central's philosophy is clear:

> We have long worked to make our stations more than just departure and arrival terminals for rail passengers. Our goal in the area of station development is to create environments that everyone can enjoy. To fulfill this aim, we are striving to equip our stations with a number of services - including travel centers, restaurants, and shopping centers - that will encourage people to regard stations as a focal point of their daily activities. Our success stories in this area include Eki One at Nagoya Station and Asty at Shin-Yokohama and Kyoto stations (Central Japan Railway Company, 22)

It was in this spirit that, from December 1990, JR East was managing the ski resort of Gala-Yuzawa, located on the Joetsu line near the Echigo-Yuzawa (Niigata) station (Figure 5.15). This investment proved beneficial to both the company and the small community. During the first season, there were 370,000 visitors to this seaside resort, half of which came via the high-speed train (East Japan Railway Company, 1991: 24-25). Apart from generating revenue for JR East, the skiers also brought business to the local commercial establishments such as hotels.

This example shows the extent to which the Shinkansen could boost the economy even in a village hitherto isolated in the Japanese Alps, but which, thanks to the high-speed train found itself a scant 80 minutes from the national capital. This was the kind of development that the government planners had hoped to encourage with the help of private promoters.

In the short and mid terms, it was the tourism generated by the Shinkansen which gave a new dynamism to the smaller villages. Too small to become business centers, they looked to making the most of the physical characteristics of their land (e.g. thermal

springs[2]). We should not expect these isolated centers to become industrial or science cities. A similar phenomenon was seen on the TGV- Paris/South-West route.

> It is perhaps the growth in tourism in the traditional regions that may be linked most strongly to the TGV. The increase in group travel, seat reservation or entire trains towards the Alps or the Mediterranean South, the number of passengers who have traveled in the TGV shows the popularity of this fast and comfortable mode of transport which is cheaper than the airplane. The TGV was first choice of the elderly tourist headed towards leisure spots. Beside this tourism which may be termed "receptive", there were other effects of the "tourism-excursion", bus tours which started from the stations into interesting regions (Bourgogne…), gastronomic tours to Dijon and Lyons (Caralp, 1988: 18)

Other stations, like the one at Shin-Yokohama, being situated in rural areas, have physically changed their environment. The above-mentioned station was constructed to decrease the population in the old, over-burdened quarters in Yohohama by creating multipolar centers of activity.

The station at Yokohama is a prime example of the important changes which can be brought about over an entire region by this kind of infrastructure (Figure 5.16). Inaugurated on 1 October 1964 and situated a few kilometers from the center of Yokohama, it has transformed the territory which gave birth to it. Originally placed in the midst of paddy fields and forests, it caused the surrounding lands which had been reserved for agriculture to appreciate markedly. And soon, based mainly on the service industry, urbanization took hold.

The Shin-Yokohama district, which had been once left out in the sun, today boasts of imposing commercial, administrative and educational buildings such as hotels, restaurants, schools, shops as well as banks. Easily accessible thanks to the high-speed transport system, this station was destined for a bright future right from its birth.

Figure 5.15: GALA-YUZAWA SKI RESORT

Source: East Japan Railway (1992).

Figure 5.16: SHIN-YOKOHAMA STATION

Source: Central Japan Railway (1992). Orange Map.

5.2 THE SHINKANSEN NETWORK AND REGIONAL ECONOMIC DEVELOPMENT

To think of land management is to think also of the possible impact of these changes on regional economic development. According to the Japanese land management policy, the Shinkansen network was seen as an instrument which would reorganize the relations between the different regions of the archipelago. Obviously, this process could not but effect the economic activities of several urban agglomerations as well as entire prefectures. In December 1985, in an article entitled *Japon: l'effet Shinkansen*, Ryosuke Hirota, deputy director of the National Railway construction service, described the major effects of the network on the Japanese lifestyle:

> Indirectly, it naturally comes down to the gross domestic product. Till date, the Shinkansen has accounted for some 710 billion passenger-kilometers, saving an estimated 3000 million hours in travel time as compared to the semi-express trains on conventional lines. At an average salary of 1200 yen per hour, the high speed train has thus caused savings amounting to some 3.6 trillion yen. It is evident that it has boosted national productivity and thus contributed to economic development.
>
> The second indirect effect was its contribution to the regional economic development. The growth in inter-regional travel not only improved the economy, culture and standards of living, but also led to a greater appreciation of regional values by boosting tourism (Hirota, 1985-1: 681).

It has proved difficult to isolate the effect of the Shinkansen from other governmental land management programs such as highways and to establish with any certitude the specific role played by this mode of transportation in this process. Nevertheless, the analysis of certain economic indicators reveal significant fluctuations which coincide very frequently with the inauguration of new Shinkansen sectors. Though such an apparent correlation may not be proof of a direct and absolute relation, it merits a serious thought.

The growth of many economic activities depends on the degree of accessibility offered by the transport infrastructure. Thus, in North America, the convenient location of major commercial centers near highway crossroads is not a fortuitous accident. It is the result of a clear marketing strategy to offer easy access to a largely motorized clientele. Though such a model was also followed in Japan, due to the importance of railroads in this space-constrained archipelago, it was the train stations which turned into major centers of all socio-economic activities.

[2] The tertiary sector, which comprises of all service-oriented businesses and retail selling is closely linked to the availability of an efficient system of transport. Easily established around railway stations, the growth of this sector is a reliable indicator of the economic influence of the network on a region.

For the purposes of this study, two statistical databases covering the major activities of the tertiary sector were used as indicators: the data from the Management and Coordination Agency of the Growth of the Service Industry and from the Ministry of International Trade and Industry dealing with Retail Businesses. They cover the periods 1960 to 1991 and 1964 to 1991 respectively. To encompass and measure the regional effects of the high-speed train, these figures were grouped according to five geographic entities: 1) Japan; 2) the prefectures traversed by the Shinkansen; 3) the station-towns of the network with a population of over 100,000; 4) the Tokyo area; and 5) the Osaka area. Appendix 3 gives a sector-wise listing of the prefectures, their population as well as the station-towns considered.

Only the data from those station-towns which had an actual or imminent potential for major expansion were considered. This segregation was done by using the population as the deciding factor (≥ 100,000). Therefore, small villages like Echigo-Yuzawa and Urasa (Niigata) on the Joetsu line were rejected for the statistical analysis.

5.2.1 The Shinkansen network: a precious ally for the expansion of the service industries

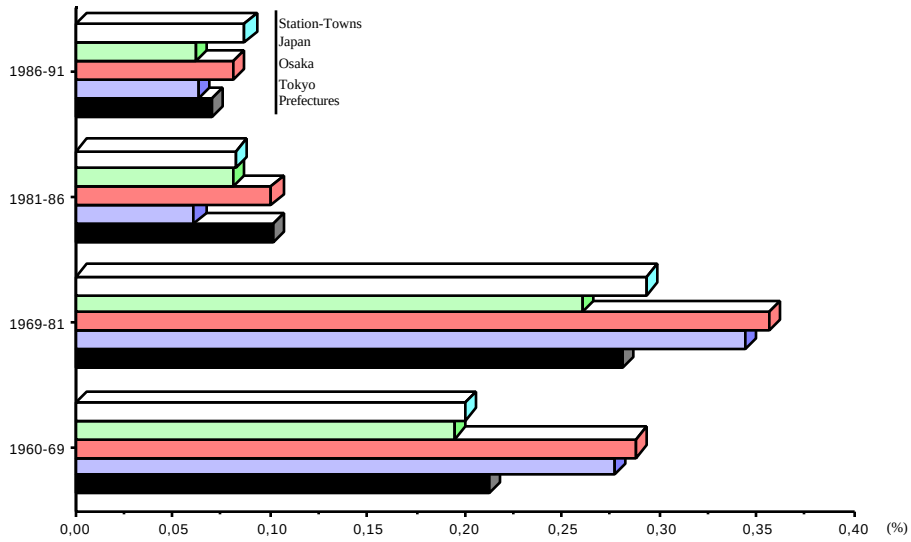
The spatial and chronological study of the regional statistics proves that in several cases, a rapid growth in the number of service industries coincided with the inauguration of a new sector of the network .

> In these ways, the introduction of the Shinkansen has contributed to the establishment of a more efficient society and more efficient society and more efficient economic structures in present day Japan. As a result, however, differences in economic progress have been appearing between cities that have Shinkansen stations and cities along the Shinkansen route but without Shinkansen station (Hirota, 1985-2: 260).

From 1960 to 1981, there was an eye-popping growth in service outlets as may be seen in Figures 5.17 (Appendix 4). Though the post-war economic success of Japan was due mainly to the secondary industry, an important portion of this accomplishment

was located in the tertiary sector (Japan Statistics Association, 1987: 389) [5]. The country's economic performance could not but favor a process which effected all the major industrialized nations of the world. Sustained by the economic boom, this sector benefited greatly by the new-found wealth of the Japanese citizen. The recession which began in 1982 dealt a heavy blow to this era of abundance.

Figure 5.17a: GROWTH OF THE SERVICES ESTABLISHMENTS LOCATED AROUND THE TOKAIDO LINE, 1960-1991



Source: JAPAN. Management and Coordination Agency. Establishment Census of Japan: volume 2: Results for Prefectures.

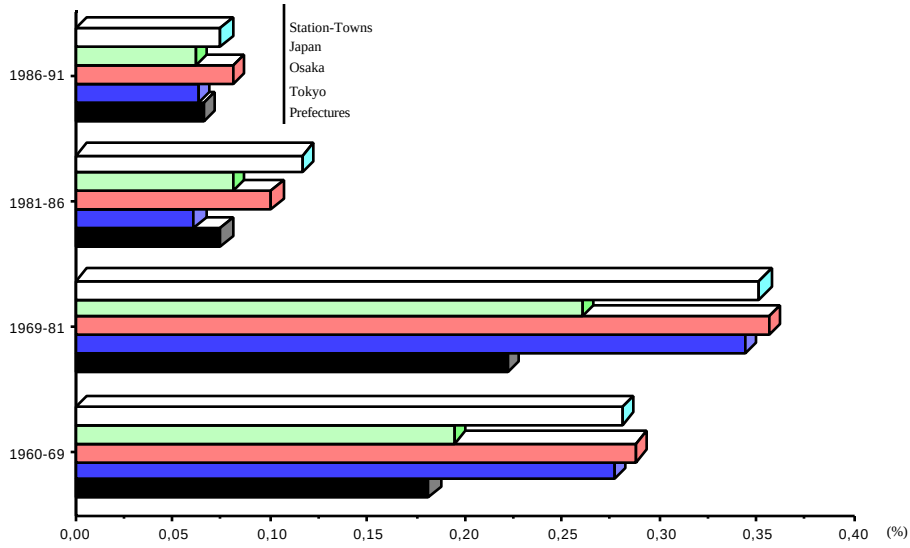
Along with the demographic and the economic growth of the 1960s to the 1970s, Tokyo and Osaka also saw a major increase in the number of service oriented enterprises (Figures 5.17a and b). They were far ahead of the other agglomerations in the archipelago. The economic crisis which set in in 1982 and the decline of the population of these urban centers desired by the government and made possible by the extensions of the Shinkansen and highway networks contributed to this phenomena.

Though they continued to occupy an important place within the national scene, the growth of the tertiary sector waned within these agglomerations. With the advent of the 1980s, the Tokyo metropolitan area ranked below (1981-1986) or almost equal (1986-1991) the national average (Japan) in this regard.

5. In 1950, 29.7 % of Japanese workers were attach to the tertiary sector. Twenty years later, they were 46.6 %, and 59.1 % in 1990 (International Society for Educational Information, 1993: 88).

Between[2] 1960 and 1981, though the towns and prefectures located between the terminal points of the Tokaido saw a greater than average expansion, it was still much less than those of the capitals of Kanto and Kansai. But after 1980, this gap was reduced (1981-1986) and inversed (1986-1991).

Figure 5.17b: GROWTH OF THE SERVICES ESTABLISHMENTS LOCATE AROUND THE SANYO LINE, 1960-1991



Source: JAPAN. Management and Coordination Agency. Establishment Census of Japan: volume 2: Results for Prefectures.

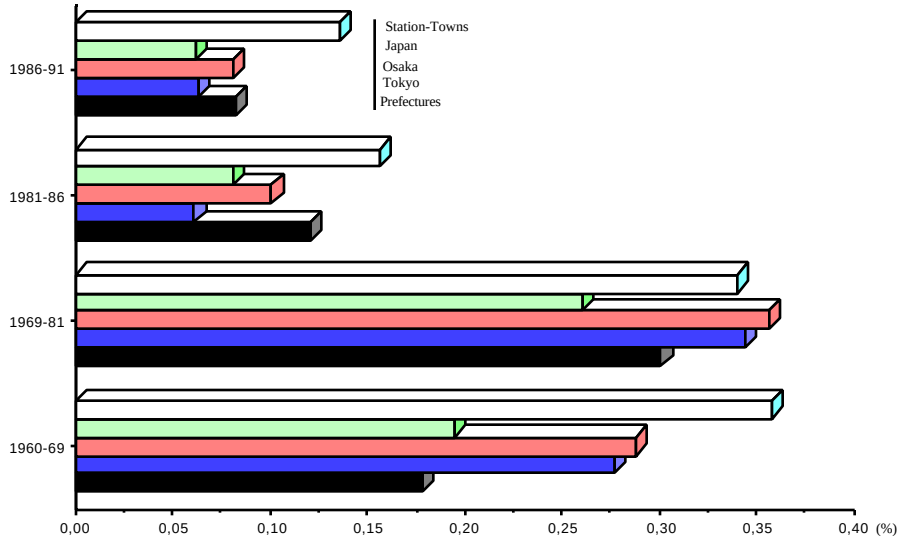
As opposed to the Sanyo line, which already had several, large urban agglomerations, the growth would also be felt in the regions which boasted of a high-speed train station. Moreover, their growth paralleled those seen in the metropolitan regions of Tokyo and Osaka. In contrast to the vitality imbued in the station-towns, the hinterland benefited only superficially from the Shinkansen. These numbers indicate a reorganization and consolidation of commercial activities limited to the areas immediately surrounding a station. Okabe (1980) arrived at similar conclusions in his study of the effects of the Sanyo line on local communities.

> The reduction of time-distance by the Shinkansen leads to greater social and economic interchange between the local train-stopping cities and the major central cities, and enables the local cities to undertake more of their own city functions. On the other hand, part of a local city's extensive commercial functions is likely to be taken over by the central cities.
>
> This will eventually lead either to the concentration or to the dispersion or shifting of city functions, with some cities prospering and other declining. At any rate, the Shinkansen triggers changes in the regional setup, which was previously based on slower transport (mainly the non-Shinkansen railway lines). These changes take place, for instance, in the distribution of

[2] the extensive city functions, intercity relationships, and in the connection between a city and its hinterland (Okabe, 1980: 105-106).

A similar phenomenon is seen on the Tohoku and Joetsu lines (Figure 5.17c and d). Station-towns experienced a stronger growth of the service industry than the rest of the prefecture (excepted in 1981-1986 for the Joetsu line) and the two biggest cities of the archipelago. These businesses had a strong tendency to cluster around the network's agglomerations at the detriment of those areas which were not serviced by the high-speed train and therefore whose clientele was lured away to these regional rail centers. Still, it must be noted that these outlying regions performed better than the national average.

Figure 5.17c: GROWTH OF THE SERVICES ESTABLISHMENTS LOCATED AROUND THE TOHOKU LINE, 1960-1991



Source: JAPAN. Management and Coordination Agency. Establishment Census of Japan: volume 2: Results for Prefectures.

The period 1981-1991, which coincided with the inauguration of the Tohoku and Joetsu lines, saw a significant growth in station-towns, especially along the Tokyo-Morioka section. Though the high-speed train should not be seen as a miracle remedy for periods of economic recession, its installation did help considerably to stem the tide in many regions plagued by this problem.

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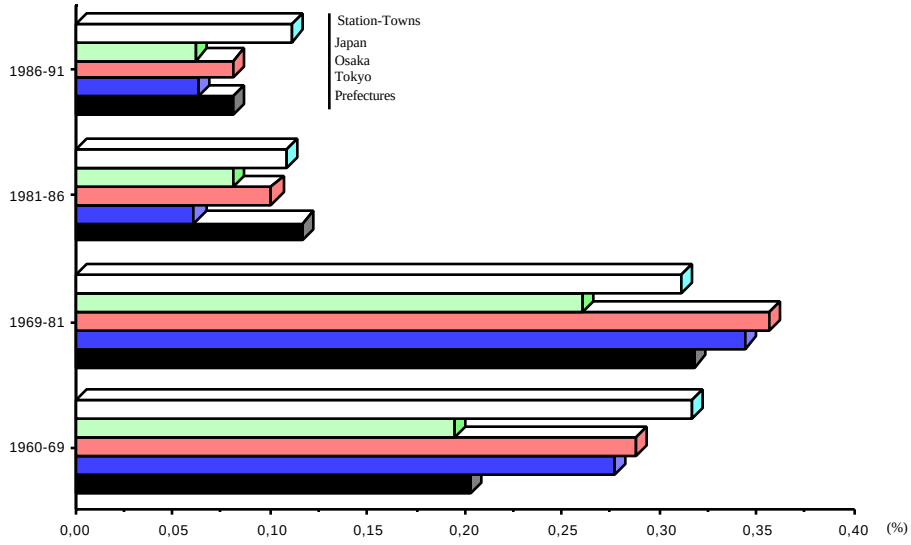
Figure 5.17d: GROWTH OF THE SERVICES ESTABLISHMENTS LOCATED AROUND THE JOETSU LINE, 1960-1991



Source: JAPAN. Management and Coordination Agency. Establishment Census of Japan: volume 2: Results for Prefectures.

5.2.2 Railway stations and their allure for the retail business

Japanese train stations are known for the number of retail sale outlets in their vicinity. As the commercial heart of many a town, they bring together scores of departmental stores and specialty shops. When such centers are serviced by a conventional rail line, their sphere of attraction is generally limited to the people living relatively close by. The construction of a Shinkansen station greatly expands this sphere to include many outlying regions which were once considered too far. Such a growth in the market could not but engender more business opportunities for the traders close to this station.

As a transit hub for passengers coming from or going to other regions connected by the network, every town which boasted of a Shinkansen station and which could restructure its commercial enterprises accordingly, could not but prosper. If, on the other hand, these towns did not take advantage by offering products in the quantity and quality in which they could be had at the large commercial centers which were now easily accessible by the high-speed train, they risked losing clients. Now that people and information could circulate much more quickly, the competition which had been limited till date to the locality, now waxed national.

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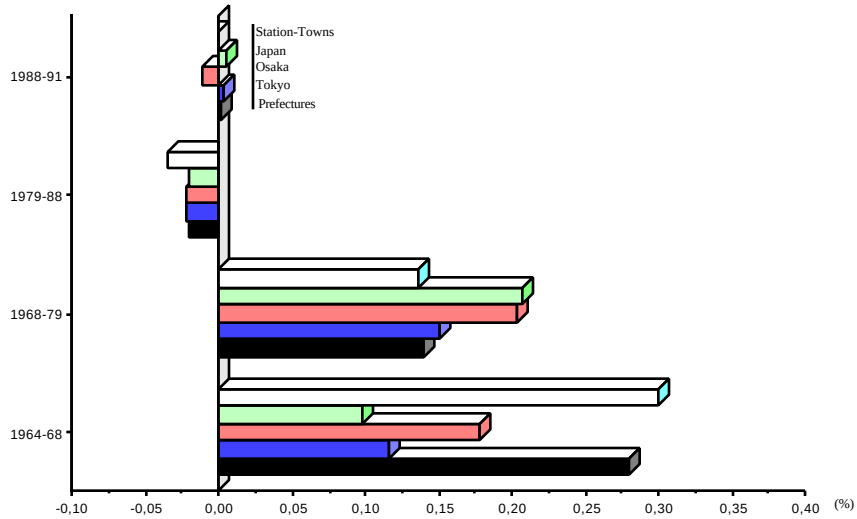
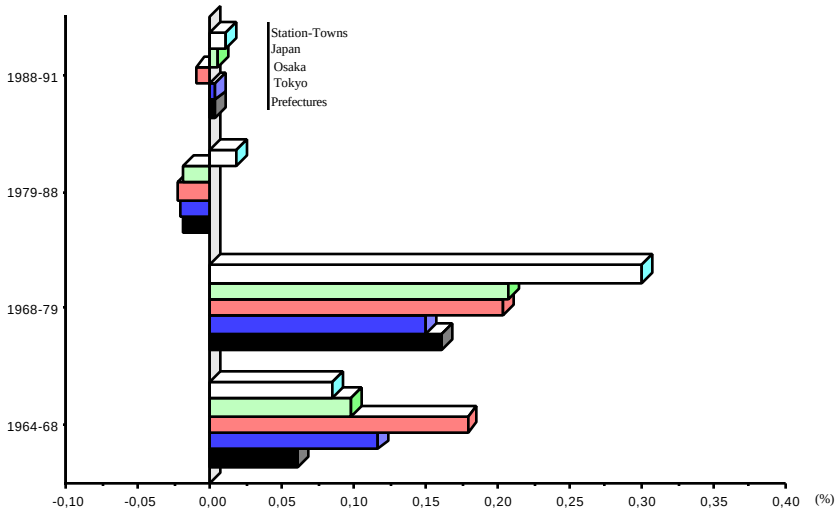
Figure 5.18a: GROWTH OF WHOLESALE AND RETAIL ESTABLISHMENTS LOCATED AROUND THE TOKAIDO LINE, 1964-1991



Source: JAPAN. Ministry of International Trade and Industry. Census of Commerce: Volume 3: Report by Industries (Cities, Towns and Villages).

The analyzed statistics show that there is compelling evidence which indicates that the installation of a Shinkansen station was followed by a significant increase in the number of retail businesses (Appendix 5). The numbers obtained for the station-towns are markedly higher than the national average. This tendency was observed in the case of the Tokaido (1964-1968) and Sanyo (1968-1979) lines (Figures 5.18a and 5.18b).

Figure 5.18b: GROWTH OF WHOLESALE AND RETAIL ESTABLISHMENTS LOCATED AROUND THE SANYO LINE, 1964-1991

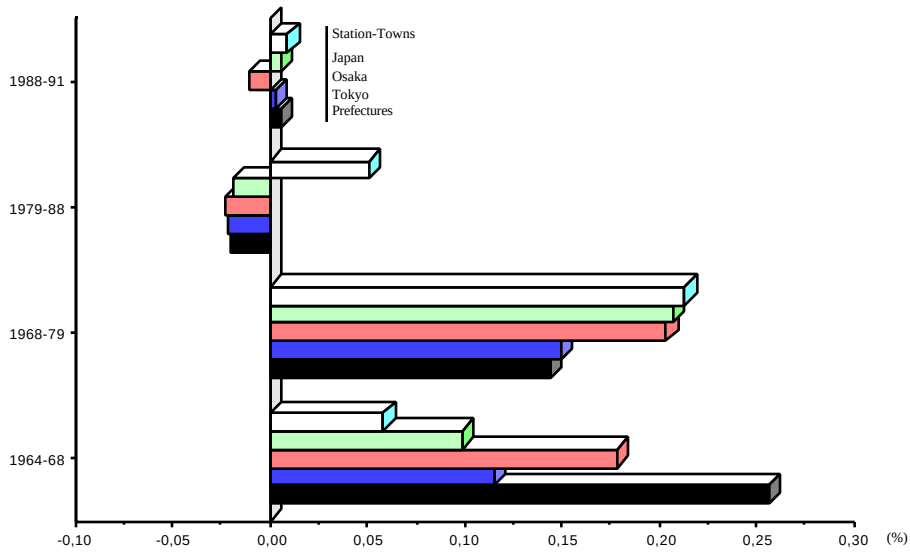


Source: JAPAN. Ministry of International Trade and Industry. Census of Census of Commerce: Volume 3: Report by Industries (Cities, Towns and Villages).

[2] This may be explained by the willingness of many growing regional centers which had been linked by the Shinkansen to adapt their environment to the anticipated trends. Their rapid growth as compared to the mature agglomerations like those of Tokyo and Osaka was caused by the fact that they had to play catch-up in order to satisfy new expectations and demands. Once these needs had been met, the growth slowed down during the 1970s to finally bring it at the same level as that of the national average. This would indicate that the Shinkansen effect was short-lived. Once the adjustments had been made, the growth reverted to that of the Japanese average.

An identical scene unfolded itself in the regions serviced by the Tohoku and Joetsu sectors with the sole difference that there, this boom began much before the inauguration of this rail service (Figures 5.18c and 5.18d). The announcement of construction of these lines in the early 1970s caused a flurry and a spurt in the growth of the retail businesses. This development was due in part to the long preparatory period prior to the extension of the Shinkansen network and in part, to the lessons learn from past experience.

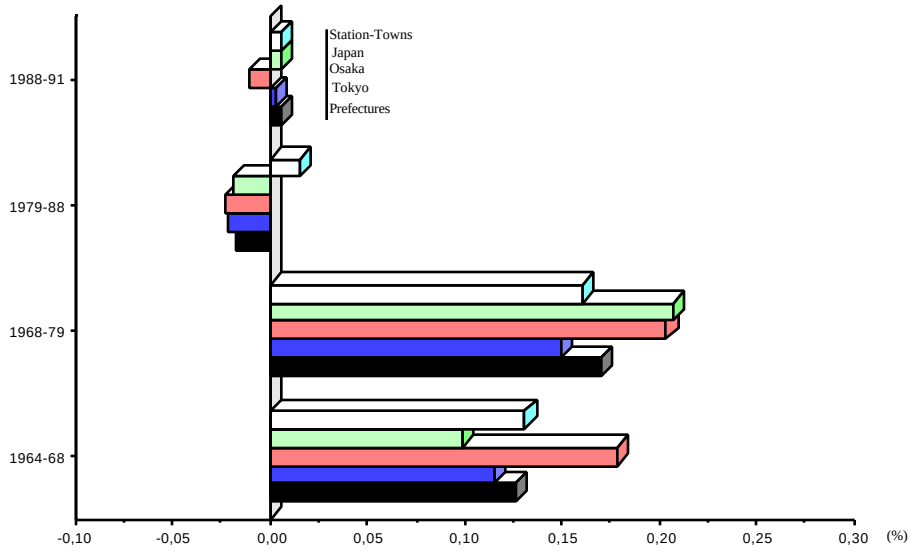
Figure 5.18c: GROWTH OF WHOLESALE AND RETAIL ESTABLISHMENTS LOCATED AROUND THE TOHOKU LINE, 1964-1991



Source: JAPAN. Ministry of International Trade and Industry. Census of Commerce: Volume 3: Report by Industries (Cities, Towns and Villages).

2

Figure 5.18d: GROWTH OF WHOLESALE AND RETAIL ESTABLISHMENTS LOCATED AROUND THE JOETSU LINE, 1964-1991



Source: JAPAN. Ministry of International Trade and Industry. Census of Commerce: Volume 3: Report by Industries (Cities, Towns and Villages).

Though the recession of 1982 put a dent in the growth of these enterprises, the establishment of the Shinkansen made sure that, between 1979 and 1991, this increase was higher than the national average. On the other hand, it must be noted that the growth in the area around Joetsu line fell clearly short of the performances posted along the Tohoku line (Figures 5.18c and 5.18d). This may be due to a smaller population base and the inability to attract new clients because of the geographic conditions.

Even though the network cannot explain all the changes, it clearly remains a pole of attraction for businessmen. An office or an outlet in a station-city can cater to a much larger clientele and is assured of a high visibility due to the thousands of daily travelers.

Taking it as a whole, it is evident that all the station-towns profited, albeit unequally, by the presence of the Shinkansen. As it happened for the service industry, this development too did not spread evenly throughout the prefectures. Except for the Tokaido, all the other prefectures benefited only a little after the inauguration of a high-speed service. The data suggests that regions in the immediate vicinity of the stations gained the most from the network. In the case of the Tohoku and Joetsu lines, in the 1970s, the intense preparation by the station-towns to receive the high-speed train resulted in their surpassing the prefectural growth rate. It would seem then that the

Shinkansen[2] favored the organization and centralization of socio-economic activities within a very limited area, to the detriment of the hinterland.

5.3 CONCLUSION

The Shinkansen has revolutionized the lifestyles of millions of Japanese. It has greatly improved interchanges between regions which once could be accessed only with much difficulty. Moreover, it helped the spread of the population into regions once considered remote. This is its principal contribution to Japanese land management policy.

On the other hand, while it helped spread socio-economic activities into some station-towns and gave people in the hinterland a fast and efficient access to the large centers of the archipelago, it still proved detrimental for them. These inequalities can only be addressed by further extending the network into the remaining isolated regions.

CONCLUSION

From a program which was conceived originally to simply improve the traffic between Tokyo and Osaka, the Shinkansen grew into the world's first high-speed rail network. From the 1960s, it became the primary tool for the Japanese government's land management and regional economic development policies. Though it gave rise to intense political greed and infighting, the high-speed train did end up by benefiting the Japanese people.

This study was undertaken to validate a general and two working hypotheses. The results seem to fully justify the use of the preceding analysis model to study the Québec government's railway policy. To this end, the author was able to take recourse to it without facing any methodological difficulties.

It turns out that in Japan, as in most other countries, the aim of transportation is to help empower the government in implementing its land management and regional economic development policies. Only the public sector had the legal and financial resources to organize and operate such a rail revolution.

On the other hand, was the government policy regarding the Shinkansen network a result of the effects of societal forces on the Japanese government ? It would seem so. Though it was brought about by only a small number of their agents, namely, the political and economic decision-makers placed strategically in the administration. The public had more of a moral right than any real power to do much when confronted by the decisions made by the directors of the Shinkansen network. The events concerning the residents of Nagoya who were affected by the noise and the vibrations of the high-speed train is a case in point.

This rail network was constructed to address certain problems posed by the economic growth of Japan. In the 1960s, government planners unveiled the proposed solution to these unforeseen difficulties. Despite the honesty and good faith of most of the technocrats, the blueprints of the Shinkansen network proved to be a gold mine for many politicians and businessmen. Many profited greatly from the construction contracts and the price-hike of the lands on or bordering a rail line. In this regard, the study of the paper media shows that certain societal forces could influence the course of the Shinkansen network to suit their own ambitions, often to the detriment of the

highest[2] interests of the nation. This problem was due to the fact that the high-speed train belonged to a public corporation.

Despite the profits made by some people and businesses, on the whole, the idea of the development of the network stemmed from sound intentions, in keeping with the socio-economic needs of the nation.

Finally, did the Japanese government contribute to land management and regional economic development by its intervention in the railroad transportation sector ? This second hypothesis is difficult to answer as the Shinkansen is a recent phenomenon. Still, the data gathered show a better distribution of human activity within the archipelago, a move facilitated by the new rail lines.

Lessons for the future

Since October 1964, the Shinkansen has proved to be an undeniable success. Nevertheless, one must keep in mind the fundamental premises which led to the success of the Japanese high-speed train and formed the basis of its accomplishments.

The program was further molded by considerations stemming from the internal environment of Japan. The human and physical characteristics combined to form ideal conditions which maximized the socio-economic profitability of such a transport system, perhaps more so than in any other country.

Japan is densely populated, with more than 60% of the population packed in the Tokyo-Osaka megalopolis alone, which accounts for only 27.5% of the total land area of the archipelago. This is a fundamental determinant which too many planners in other, less densely populated countries tend to forget when they talk about the possible advantages of such a train to their country. To this must also be added the running costs of an automobile and the numerous other inconveniences which the Japanese car driver must face (e.g. traffic jams) which made the Shinkansen such a success.

Four qualitative factors explain the popularity of the Shinkansen rail network right from its inception: the frequency of daily departures, its speed, passenger safety and the poor quality/price ratio of the other competing modes of transport over medium distances. The combinations of these four was what made the high-speed train so profitable and such a grand success.

Despite its prohibitive cost of construction due to its dedicated lines and many engineering feats, the Japanese could permit themselves the Tokaido and Sanyo lines

between[2] Tokyo and Fukuoka, knowing that the hundreds of thousands who would use them yearly would guarantee profits. Profits were much harder to come by outside this heavily populated corridor. The massive investments required proved to be difficult to recover in the mid term.

The directors of the JR Group realized this very soon. To reach out into the hinterland and to meet the government's expectations regarding land management and regional economic growth, they had to put into place a fast train which would provide quality service at reasonable rates. As the conventional Shinkansen was not suited for less densely populated areas, an alternative, less expensive means had to be found. The solution lay in improving and sharing the existing rail lines. This would allow the high-speed network to be extended outside the heavily used corridors of the archipelago.

Thus the mini-Shinkansen was found to be the ideal solution for these regions. Guided by the same objectives which had made the Shinkansen so successful, this technology allowed the expansion of this tradition of excellence while respecting the conditions of the new territory and market.

Other countries should take into account the global Japanese experience before deciding on any particular rail technology. This is the only way to maximize the quality/price ratio so dear to the consumer while making the best use of public funds.

The mini-Shinkansen reconciled profitability to the socio-economic aspect. In the same manner, the ETR 450 Pendolino in Italy and the X-2000 in Sweden also sought to bring together passenger requirements and a rail network adapted to individual market conditions. Using tilting technology, these trains attained commercial speeds of 200 to 250 km/h.

In Japan, the profitability of the high-speed train depended equally on the diversification of the railroad companies running it. The JR Group did not only manage the high-speed train, it also branched out in related businesses. It adroitly recovered the expenses incurred by their clients by taking over hotels, restaurants, commercial centers and holiday resorts located close to their railroads. This integrated approach increased revenue while minimizing the risks of over-concentrating in less profitable sectors.

In every continent, the future and the very survival of passenger rail transport depends on the modernization of the large, antiquated rail systems and the establishment of high-speed rail lines. To this end, planners should take care to develop solutions adapted to the peculiarities of their region instead of a simple transplantation

of some[2] fine technology into different environments. It is not only a question of maximizing socio-economic and financial benefits, but also a means towards an efficient and long-lasting growth.

2

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BIBLIOGRAPHY

---------- All Aboard the Gravy Train. *The Economist.* 16 June 1990: 68.

---------- High-Speed Train Worldwide. 1994 *Japan Railway & Transport Review*. **3**: 63-65.

---------- 3-hour Tokyo-Osaka Run by Train Found Possible. *Japan Times.* 27 May 1957: 3.

---------- A Story of Half Success: Nationalized Operation Drawbacks Bared by Recent Railway Report. *Japan Times.* 15 June 1963: 12.

---------- Editorial: The JNR Scandal. *Japan Times.* 8 July 1963: 12.

---------- Japan's Airlines Step Up Service. *New York Times.* 14 March 1965: 21.

---------- New Tokaido will Reach Hakata in '75. *Japan Times.* 20 March 1965: 4.

---------- New Tokaido Trains “Dangerous:” Union. *Japan Times*. 17 November 1966: 3.

---------- Sanyo Line Construction Begins March. *Japan Times.* 17 November 1966: 3.

---------- JNR Reveals 20-Yr. Plan for more “Bullet Trains”. *Japan Times.* 1 September 1967: 4.

---------- New Tokaido Line Expansion Planned. *Japan Times.* 27 August 1968: 3.

---------- “Bullet Train” Ok'd on Okayama-Hakata Line. *Japan Times.* 13 September 1969: 3.

---------- Move on New Tohoku Line Seen Soon. *Japan Times.* 2 October 1971: 3.

---------- Residents Oppose New Bullet Line. *Japan Times.* 10 February 1972: 2.

---------- Urban Land Prices Rise After Tanaka Plan Bared. *Japan Times*. 15 December 1972: 2.

---------- Bullet Train Noise Curbs Proposed. *Japan Times.* 20 December 1972: 2.

---------- Council Okays Plan for Shinkansen Lines. *Japan Times.* 3 November 1973: 3.

---------- Nagoya Residents File Suit Against Shinkansen. *Japan Times.* 31 March 1974: 2.

---------- JNR Expertise Used to Help Countries Around the World. *Japan Times.* 1 January 1977: 2.

---------- Government to Conduct Study of Five New Bullet Train Lines. *Japan Times.* 13 April 1977: 2.

---------- Gov't Approves Construction of Five New Shinkansen Lines. *Japan Times.* 4 October 1978: 2.

---------- Nagoya Court Rejects Bid to Slow Down Shinkansen. *Japan Times.* 12 September 1980: 1.

---------- Nagoya Court Refuses to Order Slowdown of Shinkansen Trains. *Japan Times.* 13 April 1985: 1.

---------- JNR Applies to Build New Shinkansen Line. *Japan Times.* 30 August 1986: 2.

---------- Gov't OKs Construction of New Shinkansen Lines. *Japan Times.* 31 January 1987: 2.

---------- JR Compagnies Cool to Plans for New Shinkansen Lines. *Japan Times.* 18 December 1987: 2.

---------- Regional Business Call for New Shinkansen. *Japan Times.* 2 March 1988: 9.

---------- Decision on Shinkansen Leaves some Regions Feeling Let Down. *Japan Times.* 2 September 1988: 3.

---------- Nagoya Citizens Continue War Against Noise of Bullet Train. *Japan Times.* 17 December 1991: 4.

---------- Shinkansen Brings Inflation to Utsunomiya. *Japan Times Weekly International Edition*. 4-10 March 1991: 2.

AOKI, E. 1988 Socio-economic Transport Geography in Japan. *Geographical Review of Japan.* **61 (1)**: 150-158.

BELLAVANCE, M. 1985 *Les politiques gouvernementales: Élaboration, gestion et évaluation.* Montréal: Agence d'Arc, 268 p.

BERELSON, B. 1952 *Content Analysis in Communication Research.* Glencoe: Free Press, 220 p.

CARALP, R. 1988 Transports et développement régional: Les cas du Shin Kansen et du TGV Sud-Est. *Hommes et Terres du Nord.* **88 (1-2)**: 13-19.

CENTRAL JAPAN RAILWAY COMPANY. 1991 *Central Japan Railway Company: Annual Report 1991.* Nagoya: Central Japan Railway Company, 43 p.

CENTRAL JAPAN RAILWAY COMPANY.1992 *Central Japan Railway Company Annual Report 1992.* Nagoya: Central Japan Railway Company, 48 p.

DE BONVILLE, J. 1988 *Notes du cours: Analyse de contenu des médias I.* Sainte-Foy: Université Laval, Département de communication publique.

DIKSHIT, R-D. 2000 *Political Geography: The Spatiality of Politics.* New Delhi: Tata McGraw-Hill, 288 p.

EAST JAPAN RAILWAY COMPANY. 1991 *East Japan Railway Company: Annual Report 1991.* Tokyo: East Japan Railway Company, 43 p.

EAST JAPAN RAILWAY COMPANY. 1991 *Fact Book 1992.* Tokyo: East Japan Railway Company, 20 p.

EASTON, D. 1965 *A Systems Analysis of Political Life.* New York: John Wiley & Sons, 507 p.

EASTON, D. 1966 *Systems Approach to Political Life.* Boulder: Social Science Education Consortium, 22 p.

EDWARDS, G. and SHARKANSKY, I. 1978 *The Policy Predicament: Making and Implementing Public Policy.* San Francisco: Freeman, 336 p.

ELIOT HURST, M. 1974 Transportation Geography: An Overview. -In: ELIOT HURST, Michael (Ed.) *Transportation Geography: Comment and Readings.* New York: McGraw-Hill, 525 p.

FOSSETT, D. 2002 Shinkansen National Speed Records. *byun2 Shinkansen*. [Internet] [http://www.h2.dion.ne.jp~dajf/byunbyun]

GRAWITZ, M. 2001 *Méthodes des sciences sociales.* Paris: Dalloz, 1019 p.

GROTH, D. 1987 *Biting the Bullet: The Politics of Grass-Roots Protest in Contemporary Japan.* Stanford: Stanford University, Ph.D Thesis, Department of Political Science, 470 p.

HAN, J-S. 1983 Changes in the Spatial Patterns of Passenger Flows in Japan, 1963-1977. *Geographical Review of Japan.* **56-8**: 553-566.

HARADA, K. et al. 1986 *Nihon no tetsudô: Seiritsu to tenkai.* Tokyo: Nihon Keizai Hyôron-sha, 417 p.

HARADA, K. et al. 1988 *Tetsudô seisakuron no tenkai: Sôgyô kara JR made 120 nen.* Tokyo: Unyu Keizai Kenkyû Senta, 446 p.

HIROTA, R. 1985-1 Japon: l'effet Shinkansen. *Transports.* **310**: 678-683.

HIROTA, R. 1985-2 Present Situation and Effects of the Shinkansen. *Transport Policy and Decision Making.* 3: 255-270.

HIROTA, M. and IWATA, M. 1985 Impact du Shinkansen. In: FRANCE. Ministère de l'Urbanisme, du Logement et des Transports and Secrétariat d'état chargé des transports. *Les aspects socio-économiques des trains à grande vitesse. Tome II.* Paris: La Documentaire française. 655-665.

INO, T. 1986 Speed-Up on the Tohoku Shinkansen and its Impact on Regional Transport and Economy. In: World Conference Transport Research. *Research for Tomorrow's Transport Requirements.* Vancouver: World Conference Transport Research. 1082-1849.

INTERNATIONAL SOCIETY FOR EDUCATIONAL INFORMATION 1993 *A Teachers' & Textbook Writers' Handbook on Japan.* Tokyo: International Society for Educational Information, 102 p.

ISOMURA, E. 1972 Urbanization and City Planning Policies. *The Developing Economies.* **10 (4)**: 451-467.

JAPAN RAILWAYS GROUP. 1992 *High Speed Railways in Japan: Present and Future.* Tokyo: JR Group, 21 p.

JAPAN STATISTICS ASSOCIATION. 1987 *Historical Statistics of Japan.* Tokyo: Japan Statistics Association, volume 1 to 5.

JAPAN. Economic Planning Agency. 1988 *Economic Management Within a Global Context.* Tokyo: Economic Planning Agency, 76 p.

JAPAN. Economic Planning Agency. 1990 *Annual Report on Business Cycle Indicators.* Tokyo: Economic Planning Agency, 241 p.

JAPAN. Japanese National Railways. 1975 *Shinkansen jû nenshi*. Tokyo: General Division of Shinkansen, 797 p.

JAPAN. Japanese National Railways. 1986 *Shinkansen.* Tokyo: International Department, 18 p.

JAPAN. Management and Coordination Agency. *Establishment Census of Japan: volume 2: Results for Prefectures*. Tokyo: Statistics Bureau.

JAPAN. Management and Coordination Agency. 1987 *Japan Statistical Yearbook 1987*. Tokyo: Statistics Bureau, 836 p.

JAPAN. Management and Coordination Agency. 1991 *Japan Statistical Yearbook 1991*. Tokyo: Statistics Bureau, 842p.

JAPAN. Management and Coordination Agency. 1992 *Japan Statistical Yearbook 1992*. Tokyo: Statistics Bureau, 840p.

JAPAN. Management and Coordination Agency. 1995 *Japan Statistical Yearbook 1996*. Tokyo: Statistics Bureau, 914 p.

JAPAN. Management and Coordination Agency. 1996 *Japan Statistical Yearbook 1997*. Tokyo: Statistics Bureau, 914 p.

JAPAN. Ministry of International Trade and Industry. *Census of Commerce: Volume 3: Report by Industries (Cities, Towns and Villages).* Tokyo: Research and Statistics Department.

JAPAN. Ministry of Transport. 1991 *Annual Report on the Transport Economy: Summary (Fiscal 1990).* Tokyo: Transport Policy Bureau, 50 p.

JAPAN. Ministry of Transport. 1992 *Annual Report on the Transport Economy: Summary (Fiscal 1991).* Tokyo: Transport Policy Bureau, 82 p.

JAPAN. Ministry of Transport. 1996 *National Transportation Handbook 1995*. Tokyo: Transport Policy Bureau, 224 p.

JAPAN. National Land Agency. 1962 *The First Comprehensive National Development Plan*. Tokyo: National Land Agency.

JAPAN. National Land Agency. 1969 *The Second Comprehensive National Development Plan*. Tokyo: National Land Agency.

JAPAN. National Land Agency. 1979 *Sanzenso, The Third Comprehensive National Development Plan*. Tokyo: National Land Agency, 144 p.

JAPAN. National Land Agency. 1987 *The Fourth Comprehensive National Development Plan*. Tokyo: National Land Agency, 169 p.

KIENTZ, A. 1971 *Pour analyser les médias: L'analyse de contenu*. Montréal: Hurtubise HMH, 175 p.

KONNO, S. 1984 Le Shinkansen, véhicule de culture. *Cahiers du Japon*. **22**: 56-63.

KUBO, S. 1980 Maintenance System: Vehicules. In: STRASZAK, A. et TUCH, R. (Ed.) *The Shinkansen High-Speed Rail Network of Japan: Procedding of an IIASA Conference, June 27-30, 1977*. London: Pergamon Press. 397-407.

LEUNG, C-K. 1980 *China: Railway Patterns and National Goals*. Chicago: University of Chicago, Department of geography, 243 p.

MURAMATSU, M. 1975 The Impact of Economic Growth Policies on Local Politics in Japan. *Asian Survey*. **15 (9)**: 799-816.

NISHIDA, M. 1980 The Shinkansen Project: Formation and Construction Setup. In: STRASZAK, A. et TUCH, R. (Ed.) *The Shinkansen High-Speed Rail Network of Japan: Procedding of an IIASA Conference, June 27-30, 1977*. London: Pergamon Press. 289-299.

OHTA, K. 1989 The Development of Japanese Transportation Policies in the Context of Regional Development. *Transportation Research*. **23A-1**: 91-101.

OKABE, S. 1980 Impact of Sanyo Shinkansen on Local Communities. In: STRASZAK, A. et TUCH, R. (Ed.) *The Shinkansen High-Speed Rail Network of Japan: Procedding of an IIASA Conference, June 27-30, 1977*. London: Pergamon Press. 105-129.

PLAUD, A. 1977 Les nouvelles voies ferrées à grande vitesse et l'aménagement du territoire au Japon. *Transports*. **225**: 387-393.

POULIOT, M. 1980 *Le transport et la géopolitique: Analyse géographique*. Sherbrooke: Université de Sherbrooke, Département de géographie, Bulletin de recherche. **51**, 26 p.

QUESNEL-OUELLET, L. and BOUCHARD, G. 1979 Les transports urbains à Québec. *Recherches sociographiques*. **20 (2)**: 205-237.

ROBINS, B. 1988 Pressure to Grow but will they Pay their Way? *Far Eastern Economic Review*. 16 june 1988: 68-69.

SASAKI, K., OHASHI, T. and ANDO, A. 1997 High-Speed Rail Transit Impact on Regional Systems: Does the Shinkansen Contribute to Dispersion. *The Annals of Regional Science*. **31**: 77-98.

SAWADA, J. 1995 Effets de la construction du Shinkansen sur le développement régional. *Rail international*. **26 (8-9)**: 30-38.

SIMEON, R. 1976 Studying Public Policy. *Canadian Journal of Political Science*. **9 (4)**: 548-580.

TANAKA, H. 1998 L'impact socio-économique du Tokaido Shinkansen. *Rail International*. **29 (9-10)**:106-109.

TANIUCHI, T. 1984 Japanese Urban Development and the Railway Network, 1880-1980. *Geographical Review of Japan*. **57 (2)**: 111-123.

UNITED NATIONS 1964 Super High-speed Trains in Japan. *Transport and Communication Bulletin for Asia and Far East.* **37**: 16-18.

VAN LOON, R. and WHITTINGTON, M. 1976 *The Canadian Political System Environment, Structure & Process.* Toronto: McGraw-Hill-Ryerson, 572 p.

WHEELER, J. 1973 Societal and Policy Perspectives in Transportation Geography. *Economic Geography*. **49 (2)**: 180-184.

WOLFE, R. 1962 Transportation and Politics: The Example of Canada. *Annals of Association of American Geographers.* **52 (1)**: 176-190.

YAMADA. K. 1976 L'impact du "Shinkansen" et principalement de son extension jusqu'à Fukuoka sur le transport aérien au Japon. *Bulletin ITA*. **23/21**: 543-547.

YAMANOUCHI, S. 1992 Situation actuelle du Shinkansen et perspectives futures. *Rail International*. **23 (6-7)**: 87-94.

APPENDIX 1

CONTENT ANALYSIS CODING SHEET

INFORMATIONS

1.Titre:_____

2. Date du document:_____-_____-_____ 3. Page(s):_____

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REPRÉSENTATIVITÉ D'INTÉRET

4. Nom du groupe relevé dans l'article:

( ) 0 Centrale syndicale ( ) 1 Conseil du patronat ( ) 2 Chambre de commerce
( ) 3 Entreprise privée ( ) 4 Parti politique:_____
( ) 5 Groupes de citoyens ( ) 6 Groupes spontanés ( ) 7. Individu ( )
( ) 8 Presse ( ) 9 Organisation internationale ( ) 10 Gouvernement local
( ) 11 Gouvernement du Japon
( ) I Bureau du Premier ministre
( ) A Agence de planification économique ( ) B Agence de l'environnement
( ) C Agence nationale de l'aménagement du territoire
( ) II Ministère de la Construction ( ) III Ministère des Finances
( ) IV Ministère du Commerce International et de l'Industrie
( ) V Ministère des Transports
( ) A Chemin de fer nationaux japonais (Groupe JR)
( ) B Société de construction des chemins de fer japonais (JRCC)
( ) VI Ministère de l'Intérieur ( ) VII Ministère du Travail

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REPRÉSENTATIVITÉ GÉOGRAPHIQUE

5. Noms de lieux repérés dans l'article:_____

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ASPIRATIONS INVESTIES

6. Motivations intrinsèques face au réseau Shinkansen relevé dans l'article:

( ) 0 Ne s'applique pas
( ) 1 Aménagement du territoire
( ) a *Création de pôles urbains*
( ) b *Création de pôles commerciaux (et touristiques)*
( ) c *Création de pôles manufacturiers*
( ) d *Mobilité accrue des marchandises*
( ) e *Mobilité accrue des citoyens*
( ) f *Protection de l'environnement*
( ) g *Réduction de la congestion urbaine*
( ) 2 Développement économique régional
( ) a *Outil de création d'emploi*
( ) b *Outil de développement commercial (et touristique)*
( ) c *Outil de développement manufacturier*
( ) d *Outil pour améliorer la qualité de vie des citoyens*
( ) e *Outil pour accroître la concurrence intermodale*
( ) f *Outil pour réduire la consommation énergétique provenant de l'étranger*
( ) 3 Aspects socio-économiques
( ) a *Fiabilité du réseau*
( ) b *Électoralisme*
( ) c *Nationalisme économique*
( ) d *Diversification des activités commerciales du Groupe JR (JNR)*
( ) e *Construction ou extension du réseau*
( ) f *Modèle technologique à suivre*
( ) g *Exportation du savoir-faire Shinkansen*
( ) h *Modernisation / Recherche et développement (R&D)*

==========

MOYENS FONCTIONNELS

( ) 0 Ne s'applique pas ( ) 1 Participation directe
( ) 2 Financement du réseau (Coûts) ( ) 3 Privatisation
( ) 4 Aide technique ( ) 5 Réglementation économique ( ) 6 Réglementation de la sécurité

==========

DIRECTION GÉNÉRALE DES PROPOS

8. L'article est: ( ) 0 Ne s'applique pas ( ) 1 Favorable ( ) 2 Défavorable ( ) 3 Neutre

2

APPENDIX 2

POPULATION GROWTH IN JAPAN, AND IN THE PREFECTURES SERVED BY THE SHINKANSEN, 1960-1990

5.13a: Population growth in prefectures served by the Shinkansen, 1960-1990

Years	Japan	Prefectures	Prefectures excluding Tokyo and Osaka
1960-1965	0.050	0.095	0.065
1965-1970	0.054	0.082	0.085
1970-1975	0.075	0.080	0.099
1975-1980	0.041	0.041	0.059
1980-1985	0.035	0.039	0.042
1985-1990	0.019	0.030	0.039

Source: JAPAN. Management and Coordination Agency. 1991 *Japan Statistical Yearbook 1991*. Tokyo: Statistics Bureau: 26-27.

5.13b: Population growth around the Tokaido Line, 1960-1990

Years	Japan	Prefectures	Cities having a Shinkansen station
1960-1965	0.050	0.116	0.158
1965-1970	0.054	0.110	0.120
1970-1975	0.075	0.099	0.075
1975-1980	0.041	0.058	0.034
1980-1985	0.035	0.041	0.039
1985-1990	0.019	0.039	0.038

Source: JAPAN. Management and Coordination Agency. 1991 *Japan Statistical Yearbook 1991*. Tokyo: Statistics Bureau: 26-27 and 30-31.

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5.13c: Population growth around the Sanyo Line, 1960-1990

Years	Japan	Prefectures	Cities having a Shinkansen station
1960-1965	0.050	0.050	0.101
1965-1970	0.054	0.052	0.139
1970-1975	0.075	0.075	0.150
1975-1980	0.041	0.042	0.039
1980-1985	0.035	0.034	0.050
1985-1990	0.019	0.019	0.035

Source: JAPAN. Management and Coordination Agency. 1991 *Japan Statistical Yearbook 1991*. Tokyo: Statistics Bureau: 26-27 and 30-31.

5.13d: Population growth around the Tohoku Line, 1960-1990

Years	Japan	Prefectures	Cities having a Shinkansen station
1960-1965	0.050	0.039	0.174
1965-1970	0.054	0.077	0.115
1970-1975	0.075	0.100	0.078
1975-1980	0.041	0.075	0.090
1980-1985	0.035	0.052	0.041
1985-1990	0.019	0.042	0.098

Source: JAPAN. Management and Coordination Agency. 1991 *Japan Statistical Yearbook 1991*. Tokyo: Statistics Bureau: 26-27 and 30-31.

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5.13e: Population growth around the Joetsu Line, 1960-1990

Years	Japan	Prefectures	Cities having a Shinkansen station
1960-1965	0.050	0.080	0.121
1965-1970	0.054	0.090	0.099
1970-1975	0.075	0.120	0.100
1975-1980	0.041	0.078	0.058
1980-1985	0.035	0.041	0.038
1985-1990	0.019	0.042	0.035

Source: JAPAN. Management and Coordination Agency. 1991 *Japan Statistical Yearbook 1991*. Tokyo: Statistics Bureau: 26-27 and 30-31.

APPENDIX 3

DEMOGRAPHIC STATISTIC OF THE POPULATION OF STATION-TOWNS

Here is the list of the names of the station-towns which were used to study the effect of the Shinkansen network on some aspects of the regional economic development as well as their population in 1990.

Tokaido Line	
Tokyo (23 wards)	8 163 127
Yokohama (Kanagawa)	3 220 350
Odawara (Kanagawa)	193 415
Shizuoka (Shizuoka)	472 199
Nagoya (Aichi)	2 154 664
Kyoto (Kyoto)	1 461 140
Osaka (26 wards)	2 623 831

Sanyo Line	
Osaka (26 wards)	2 623 831
Kobe (Hyogo)	1 477 423
Himeji (Hyogo)	454 360
Okayama (Okayama)	593 742
Fukuyama (Hiroshima)	365 615
Hiroshima (Hiroshima)	1 085 677
Tokuyama (Yamaguchi)	110 900
Shimonoseki (Yamaguchi)	262 643
Fukuoka (Fukuoka)	1 237 107

Joetsu Line	
Tokyo (23 wards)	8 163 127
Omiya (Saitama)	403 779
Kumagaya (Saitama)	152 122
Takasaki (Gumma)	236 463
Nagaoka (Niigata)	185 938
Niigata (Niigata)	486 087

Tohoku Line	
Tokyo (23 wards)	8 163 127
Omiya (Saitama)	403 779
Oyama (Tochigi)	142 263
Utsunomiya (Tochigi)	426 809
Koriyama (Fukushima)	314 651
Fukushima (Fukushima)	277 526
Sendai (Miyagi)	918 378
Morioka (Iwate)	235 440

Source: JAPAN. Management and Coordination Agency. 1991 *Japan Statistical Yearbook 1991*. Tokyo: Statistics Bureau: 30-35.

APPENDIX 4

GROWTH OF SERVICES ESTABLISHMENTS LOCATED AROUND THE SHINKANSEN NETWORK, 1960-1991

5.17a: Growth of services establishments located around the Tokaido line, 1960-1991

Years	Prefectures (Tokaido)	Tokyo	Osaka	Japan	Station-Towns
1960-1969	0.213	0.277	0.288	0.195	0.201
1969-1981	0.281	0.345	0.357	0.261	0.294
1981-1986	0.102	0.061	0.101	0.081	0.082
1986-1991	0.070	0.063	0.081	0.062	0.087

Source: JAPAN. Management and Coordination Agency. Establishment Census of Japan: Volume 2: Results for Prefectures. Tokyo: Statistics Bureau.

5.17b Growth of services establishments located around the Sanyo line, 1960-1991

Years	Prefectures (Sanyo)	Tokyo	Osaka	Japan	Station-Towns
1960-1969	0.182	0.277	0.288	0.195	0.281
1969-1981	0.222	0.345	0.357	0.261	0.352
1981-1986	0.075	0.061	0.101	0.081	0.117
1986-1991	0.066	0.063	0.081	0.062	0.075

Source: JAPAN. Management and Coordination Agency. Establishment Census of Japan: Volume 2: Results for Prefectures. Tokyo: Statistics Bureau.

2

5.17c: Growth of services establishments located around the Tohoku line, 1960-1991

Years	Prefectures (Tohoku)	Tokyo	Osaka	Japan	Station-Towns
1960-1969	0.178	0.277	0.288	0.195	0.358
1969-1981	0.301	0.345	0.357	0.261	0.340
1981-1986	0.121	0.061	0.101	0.081	0.156
1986-1991	0.082	0.063	0.081	0.062	0.136

Source: JAPAN. Management and Coordination Agency. Establishment Census of Japan: Volume 2: Results for Prefectures. Tokyo: Statistics Bureau.

5.17d: Growth of services establishments located around the Joetsu line, 1960-1991

Years	Prefectures (Joetsu)	Tokyo	Osaka	Japan	Station-Towns
1960-1969	0.203	0.277	0.288	0.195	0.316
1969-1981	0.318	0.345	0.357	0.261	0.311
1981-1986	0.117	0.061	0.101	0.081	0.108
1986-1991	0.081	0.063	0.081	0.062	0.111

Source: JAPAN. Management and Coordination Agency. Establishment Census of Japan: Volume 2: Results for Prefectures. Tokyo: Statistics Bureau.

APPENDIX 5

GROWTH OF WHOLESALE AND RETAIL ESTABLISHMENTS LOCATED AROUND THE SHINKANSEN NETWORK, 1964-1991

5.18a: Growth of wholesale and retail establishments located around the Tokaido line, 1964-1991

Years	Prefectures (Tokaido)	Tokyo	Osaka	Japan	Station-Towns
1964-1968	0.280	0.115	0.178	0.098	0.300
1968-1979	0.140	0.150	0.204	0.207	0.136
1979-1988	- 0.021	- 0.022	- 0.023	- 0.020	- 0.035
1988-1991	0.001	0.003	- 0.011	0.005	- 0.001

Source: JAPAN. Ministry of International Trade and Industry. *Census of Commerce: Volume 3: Report by Industries (Cities, Towns and Villages).* Tokyo: Research and Statistics Department.

5.18b Growth of wholesale and retails establishments located around the Sanyo line, 1964-1991

Years	Prefectures (Sanyo)	Tokyo	Osaka	Japan	Station-Towns
1964-1968	0.060	0.115	0.178	0.098	0.085
1968-1979	0.160	0.150	0.204	0.207	0.300
1979-1988	- 0.020	- 0.022	- 0.023	- 0.020	0.018
1988-1991	0.004	0.003	- 0.011	0.005	0.010

Source: JAPAN. Ministry of International Trade and Industry. *Census of Commerce: Volume 3: Report by Industries (Cities, Towns and Villages).* Tokyo: Research and Statistics Department.

2

5.18c: Growth of wholesale and retail establishments located around the Tohoku line, 1964-1991

Years	Prefectures (Tohoku)	Tokyo	Osaka	Japan	Station-Towns
1964-1968	0.256	0.115	0.178	0.098	0.058
1968-1979	0.144	0.150	0.204	0.207	0.213
1979-1988	- 0.021	- 0.022	- 0.023	- 0.020	0.050
1988-1991	0.006	0.003	- 0.011	0.005	0.009

Source: JAPAN. Ministry of International Trade and Industry. *Census of Commerce: Volume 3: Report by Industries (Cities, Towns and Villages).* Tokyo: Research and Statistics Department.

5.18d: Growth of wholesale and retail establishments located around the Joetsu line, 1964-1991

Years	Prefectures (Joetsu)	Tokyo	Osaka	Japan	Station-Towns
1964-1968	0.126	0.115	0.178	0.098	0.131
1968-1979	0.170	0.150	0.204	0.207	0.160
1979-1988	- 0.018	- 0.022	- 0.023	- 0.020	0.015
1988-1991	0.006	0.003	- 0.011	0.005	0.005

Source: JAPAN. Ministry of International Trade and Industry.*Census of Commerce: Volume 3: Report by Industries (Cities, Towns and Villages).* Tokyo: Research and Statistics Department.