

Integrated Land and Urban Rail Development: Case Studies Illustrating the Japanese Experience

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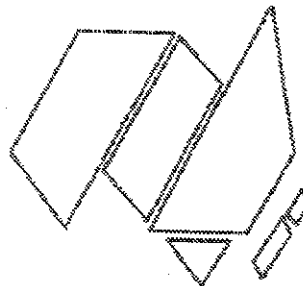
Abstract:

The importance of the "integrated development" of urban land and transport has been widely recognised and the idea incorporated in many planning studies. These studies, however, have often failed to define a tangible mechanism with which to realize the plans, and the feasibility studies that have followed, have focused on a single sector, the transport system or land development. The aim of this paper is to examine a viable process for achieving the coordinated development of land use and transport systems with specific emphasis on experience gained in Japan concerning urban rail and land development. This approach incorporates private sector involvement, and the notion of transferring (or Capturing) a part of the financial benefit gained from the land and property development to the transport operating entity; this approach also generate demand for the transport system. Five case studies are described together with an analysis of factors contributing to successful land use and urban rail development.

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1. INTRODUCTION

The importance of the "integrated development" of urban land and transport has been widely recognized and the idea incorporated in many planning studies. Often these studies, however, have failed to define the tangible mechanism with which to realize the plans, and the feasibility studies that followed, have focused on a single sector, the transport system or land development. The aim of this paper is to examine a viable process for achieving the coordinated development of land use and transport systems with specific emphasis on experience gained in Japan concerning urban rail and land development. This approach incorporates private sector involvement, and the notion of transferring (or capturing) part of the financial benefit gained from the land and property development to the transport operating entity; this approach also generate demand for the transport system. The results presented in this paper are also expected to provide basic information on the sources of financing for urban rail in Japan, examples, and underlying mechanisms of integrated development widely practiced in that country.

In the following sections, a total of five cases of integrated urban rail and land development are reviewed: i.e. Hankyu Lines; Tokyu Den-en-Toshi Line; Kobe Municipal Railway System; Chiba New Town Line; and planned New Joban Line. The Hankyu and Tokyu examples present typical forms of integrated development by private railway companies in Japan, in which diversified businesses including property development apparently cross-subsidize the railway operation. The case of the Kobe Municipal Railway is similar to that of the private railway operators, but its status as a municipal government makes it easy for it to mobilize public funds. Chiba New Town Project shows an example of the construction of a railway system by a housing authority together with a prefectural government to secure public transport access of their new town to Tokyo metropolitan area. The planned New Joban Line is still in the planning stage, but a variety of financing methods are under consideration for this project.

2. HANKYU LINES AND PROPERTY DEVELOPMENT

Hankyu Railway Company (Hankyu), one of the major railway companies in Japan, currently owns and operates four railway lines in the Hanshin Area. The total length of these lines is 146.8 km, and originate from Umeda terminal station and radiate outward, to the west, north and northeast respectively. The Hankyu lines operates in close competition with the Tokaido and Fukuchiyama Lines of Japan Rail (JR), and private lines such as the Hanshin and Keihan Railways. The *Shinkansen* (or "bullet train") also runs through the area served by these lines. Hankyu Railway Company has been undertaking housing development projects since its early days pioneering the concept of integrated urban rail and land development. Hankyu has also developed office buildings, shopping plazas, hotels and entertainment centers along its railway lines. These developments reinforce their railway operations because they create the demand for railway transportation. Similar to other private railway operators, Hankyu Railway Company operates a variety of businesses through its affiliated companies; however, the major sideline business of the parent company is real estate.

The company first constructed the Takarazuka Line in 1910. As the financial resources of the company were insufficient, the line was financed mainly by loans from commercial banks and by funds raised by the issuance of company bonds. After its opening, Hankyu found that attracting enough passengers to make it financially viable was even harder than raising funds for its construction. When the line was opened, the old establishments along the route mainly provided commuting passengers. Since it was apparent that the existing establishments did not generate enough patronage, Hankyu decided to develop residential areas on their own along the corridor. The housing project was profitable because Hankyu purchased the land for development before they opened the rail system. In those days, land values were estimated to increase about 250% before and after the opening of a rail system. As a consequence, the idea of internal cross subsidization between land development and railway enterprises was naturally considered. With its active involvement in housing development, the total area developed by Hankyu reached 1,293 ha by March 1989.

During the daytime, and on weekends and holidays, there were few passengers using the railway system, thereby reducing the efficiency of the operation. Takarazuka, the destination of the Takarazuka Line, was developed as a major recreational and entertainment center to create rail transport demand during off-peak hours. A hot spring was developed at the terminus of the line, and in 1913, the Young Girl's Opera Company was also established with regular performances at the entertainment center. In addition, a theme park was constructed within the same area. Other than the establishments in Takarazuka, Hankyu owns and operates a baseball stadium, a number of sport clubs, cinema houses and theaters.

As land development along the Hankyu corridor progressed, the number of passengers using the main terminal, Umeda Station, increased. To cope with this increase, it was necessary to increase the capacity of the terminal. The old terminal site was situated in a rather inconvenient place making it difficult to expand, but Hankyu set back the terminal about 200 meters northward and accommodated all the necessary expansion work. As a result of this redevelopment, Hankyu not only solved its terminal expansion problem but also created office and retail space in a prime spot in the center of Osaka. A large scale shopping plaza was constructed and opened in 1969 in the 79,600 sq. m. comprised by the two commercial floors underneath the new Umeda Station. The thirty-five story "Hankyu Grand Building" was constructed in the old terminal site with a total floor space of 78,300 sq.m. Hankyu also developed and redeveloped land around Umeda Station and constructed a number of office buildings, department stores, hotels and shopping plazas. With the revenue from collecting deposits and rents, Hankyu enjoys a steady stream of funds for the expansion of its other businesses including railway enterprises.

Although some of its operations currently receive low interest loans and other forms of interest subsidies from the public sector, the Hankyu Railway Company pioneered the form of integrated development by private railway companies in Japan in which the level of subsidy provided by the government is minimal. One of the company's major revenue sources is property development, including the development of housing, retail space, and office buildings. Hankyu operates department stores at terminal stations, and they own sport stadia and theaters. These diversified businesses developed along the railway corridor support the steady patronage of the railway system. The profitability of the railway business is somewhat limited due to the government fare control policy, but the Hankyu

example illustrates a way in which sideline businesses can increase the overall profitability of a railway company

3. TOKYU DEN-EN-TOSHI PROJECT

Tokyu Railway Company learned much from Hankyu Railway Company on how to integrate land development and its railway enterprise. Tokyu Railway, however, pursued housing and land development more extensively than did Hankyu. Den-en-Toshi, located in the Tama area west of Tokyo, was developed by Tokyu Railway and is now considered one of the largest and most successful land development initiatives ever undertaken by a private railway company in Japan. The project area initially encompassed 5,000 ha with a population of 500,000. Over three decades have passed since the first master plan (1956) and the commencement of land development (1959). As of November 1988, 2,872 ha with a population of 420,000 had been developed along this corridor. The land readjustment scheme initiated by Tokyu created a continuous urban area of a uniform and high quality stretching over several administrative boundaries.

Tokyu Railway Company operates six main lines, totaling about 100 km. Most of them are relatively short; the longest line is less than 30 km. As a result, the average distance traveled by passengers carried on the Tokyu lines is relatively short compared with that of other private lines. However, since the Tokyu lines serve high-density suburban areas and are supported by feeder bus services, their revenue earned per unit operating length is the highest among the private railway lines in Japan. Tokyu's railway lines form a network serving the southwestern part of the Tokyo metropolitan area. Unlike the Hankyu case, the area served by the Tokyu network is free from competition with other private lines, although a few JR lines diagonally cross the area. The Den-en-Toshi Line is a part of this network and extends 22.1 km between Futago Tamagawa and Chuo Rinkan. The construction cost of the Den-en-Toshi Line was 22 billion yen (US\$208 million) with 50% of the cost financed by loans from commercial banks and 50% from the Japan Development Bank. The Shin Tamagawa line, however, was supported by the Railway Construction Public Corporation Scheme.

In the beginning of the 1950s, the population of the Tokyo metropolitan area started to increase rapidly, leading to increased housing demand and pressures to expand the urbanized area. Influenced by the "Garden City" project in the suburbs of London, England, Tokyu Railway first conceived the "Den-en-Toshi Project" in 1953. The project area extended over 5000 ha within a 15-35 km band southwest of Tokyo, and was a hilly area that was underdeveloped due to its lack of a transport connection to the Tokyo city center.

The development area was divided into four districts and most of the area was developed under the "land readjustment cooperative" scheme. The basic mechanism of this scheme is to solicit the voluntary participation of landowners in projects to improve their properties and environments through a rearrangement of land use and the construction of necessary public facilities, such as roads, parks, and drainage. Necessary project costs are usually financed by the resale of the "reserved" land that is contributed by the landowners in return for the expected increase in land values. The cost of railway construction, however, was not covered by the resale of reserved land because railways were (and still are) not included

as one of the designated public facilities. However, Tokyu was able to exert leadership as the initiator of the project and the largest landowner in the cooperatives; therefore, it was possible for the company to promote land development along the corridor and to procure the necessary capital by taking advantage of the increased development potential of the area and by securing the land necessary for the rail right of way. Land readjustment made it possible to avoid large payments for land acquisition while attaining the voluntary cooperation of the landowners in the land development process. Tokyu undertook construction work and other necessary tasks "free of charge" for the cooperatives with an agreement that Tokyu would obtain the "reserved land" after the completion of construction.

The types of nonresidential land developed by Tokyu are similar to those developed by Hankyu. These developments included department stores, hotels, shopping plazas, and recreational facilities, but another important feature of land development in the Den-en-Toshi Project is the number of tertiary institutions established within the corridor. Several universities were attracted by the relatively low-priced land offered by Tokyu. In one case, Tokyu offered 36 ha to a prestigious university for free. These institutions helped to create the image of a high-grade residential area for the Den-en-Toshi Project.

In the process of integrated land and rail development, a question usually asked is the timing of transport system development in relation to land development; should the transport system be developed prior to land development or *vice versa*? The answer to this question is that they are planned together but land development usually precedes the transport development. There is an obvious explanation for this: for the developer, it is easier to purchase land and generate revenue with land development when a railway system is not ready for service than it is to generate revenue with a railway enterprise even when the transport system is well established. Furthermore, if there is sufficient housing demand, the absence of railway system is not critical enough to totally deter the potential buyers of new houses. In the Tokyu case, more than three decades have past since initial development, and within that time frame the railway system and the development of land have progressed almost in parallel. Land development, however, came a little before the railway development.

Tokyu Railway Company has four main lines of business: railway, buses, real estate and "others". In the company's balance sheet of revenues and expenditures for the 1988 fiscal year, railway operations accounted for 35% of revenues and real estate for 26%. However, the company's real estate operations contributed 59% to the firm's profits while the railway enterprise contributed only 47%. In addition to the various operations of the Tokyu Railway Company, the firm has a number of affiliated companies that are engaged in various diversified activities. One of these affiliated companies, Tokyu Realty, specializes in real estate. The total revenue earned by the group in 1988 was 3.1 trillion yen (US\$29.2 billion), almost thirteen times higher than the revenue earned by its parent company, the Tokyu Railway earned 242 billion yen or US\$2.3 billion in 1988). Although no detailed figures are available, it is likely that real estate operations earned a major part of the revenue of the group.

Drawing upon the lessons of the experience of Hankyu Railway Company, Tokyu Railway Company pursued housing and land development even more extensively. Den-en-Toshi

in Tama area is known as one of the largest and most successful land development projects ever undertaken by a private railway company in Japan. In the land development process, Tokyu extensively organized a "Land Readjustment Cooperative Scheme", in which public infrastructure projects (e.g., roads, drainage) were constructed without creating a financial burden for the local governments because the necessary project costs were usually financed by the resale of "reserved" land. Although the cost of railway construction was not covered by the land readjustment scheme, Tokyu was able to exert a leadership role as the initiator of the project and the largest landowner in the cooperatives. Consequently, it was possible for the firm to implement orderly and high-quality land development along the corridor and to procure the capital necessary for railway construction by taking advantage of the increased development potential of the area.

4. KOBE MUNICIPAL RAILWAY AND CORRIDOR DEVELOPMENT

Kobe is located in the western part of Japan, about 25 km west of the City of Osaka. The population of Kobe in 1990 was 1.48 million. Together with Osaka and Kyoto, Kobe functions as one of the three core cities in the Keihanshin Metropolitan Area. When Kobe faced a pressing need to expand its urban area in the 1950s, it encouraged housing development towards the northwestern part of the city. The Kobe Municipal Government's Development Bureau launched the development of a series of new town development projects that are collectively to provide 1,498 ha of residential area with a total planned population of 145,000. The Kobe Municipal Government secured public transport access to the city center by introducing the Kobe Municipal Railway system. The system, extending 22.7 km between "Shin-Kobe" and "Seishin-Chuo" Stations, was completed in 1987 and connects the three suburban new towns to the city center.

Kobe Municipal Railway operates a 22.7 km system between Shin Kobe and Seishin Chuo. There are 15 stations with an average distance of 1.6 km between the stations. It consists of a 13.3 km underground section and a 9.4 km surface section. During morning peak hours, trains run at 3-8 minute intervals. In 1990, the system carried a daily average of 223,000 passengers and earned about 30 million yen (US\$280,000) per day in fare revenue.

The underground section was constructed with the support of the "Underground Rail Construction Scheme", under which 60 percent of the construction cost is subsidized by the central and local governments. The surface section was constructed under the "New Town Railway Construction Scheme", under which 36 percent of the construction cost of the ground-level infrastructure (except the railway track) is subsidized. Kobe Municipal Railway was eligible to receive these subsidies because it is constructed by a municipal government. Besides central and the local government subsidies, the Kobe Municipal Railway is financially supported by three other types of financial sources.

The first type of financial source is one kind of developer's contribution mandated by the agreement called for by the administrative guidelines concerning new town rail development. The agreement specifies that the new town developer pay a part of the construction and land acquisition costs to the railway developer. In the Kobe case, the city's Development Bureau, as the land developer, made this contribution and transferred the rail

right-of-way within the development area to its Transport Bureau, which constructed the railway system.

The second type of financial source is another type of developer's contribution based on a development guideline enacted by the city in 1973. The guideline instructed land developers to transfer land within the development area to the railway operator free of charge and to pay the total cost of purchasing land required outside the development area. In addition, the land developers were made to bear the total construction cost for ground-level infrastructure, and to contribute the local subsidy portion required by the Underground Rail Construction Scheme. The developers in this area consisted of the city's Development Bureau, the Public Housing Development Public Corporation and private developers. The rate of developer's contribution was determined based on the distance from Tokyo Station and the distance from the nearest Municipal Railway station. The actual amount of contribution is calculated by multiplying the development area by the respective charge rates.

The third type of financing source is internal cross-subsidization. Subsidies and contributions from the national government, the local government and land developers cover only a portion of overall construction costs, and the remaining part must come from fare revenues and/or other sources. Kobe City generates the necessary funds by land development and associated businesses. The city's Development Bureau is the major developer of the new towns along the corridor and the profit generated by these developments is used to cross-subsidize railway investment and operation. The profit made by the real estate project is entered into the city's general fund, and then an internal subsidy is made to pay back a part of the initial investment and cover the loss incurred by the railway operation. The following sections elaborate on the land development along the corridor implemented by the city government.

The three major housing developments initiated by the Kobe city government have been "Suma New Town", "Seishin New Town" and "Seishin Minami New Town". Although the area is being developed as a suburban residential district, the land use plan for the new town allocates approximately 13% of the total land area for commercial activities (e.g., retail, office). The purpose of this arrangement is to make the area more self-contained, to provide employment opportunities closer to the residential area, and to create reverse-flow railway traffic. These new town developments have helped provide a steady increase in passengers.

The Kobe city government also constructed industrial estates along the Railway corridor. A 94-hectare Seishin Industrial Park hosted 133 companies in 1990, mostly in the manufacturing sector. A so-called research and education core is also located along the Municipal Railway. The 380-hectare site already includes four colleges and universities. These establishments are integrated with residential and other land uses. The "Kobe Sogo Undo Koen (Sport Stadium)" is also the name of the nearby railway station of the Municipal Railway. Several car parks are constructed to implement a "park and ride scheme" to encourage private car commuters to use the Municipal Railway. Bus terminals are constructed in front of railway stations, and a city-operated-bus-railway seasonal pass has been introduced to increase public transport patronage. The city government also owns

a subsidiary company that manages four office and commercial buildings on top of Municipal Railway stations. Rent revenues from these properties amount to about 890 million yen (US\$8.4 million) per year.

With the lessons learned from the experience of private railway companies, the Kobe municipal government has constructed its own railway system. It has created many activity centers along the railway corridor, including new towns, industrial parks, a research and education core, a freight distribution center, a sports stadium and a shopping plaza. Its status as a public sector entity has made it possible for it to mobilize more public funds than a private sector organization could have done. The 247 billion yen (US\$2.3 billion) construction cost was partially covered by central and local government subsidy schemes, but profit made from the corridor development initiated by the city government indirectly cross-subsidizes the investment and operation of its railway system.

5. CHIBA NEW TOWN PROJECT

The goal of the Chiba New Town project is to create a new suburban housing area about 25 km east of Tokyo and 15 km west of Narita International Airport. The site is 18 km long and 2 to 4 km wide, covering a total development area of 1,933 ha. The project was initiated in 1963 by Chiba Prefectural Government and later restarted in 1978, when the Housing Development Public Corporation (Jutaku Toshi Seibi Kodan) joined. It is expected to be completed by 1995. The total development cost is estimated to be about 980 billion yen (US\$9.2 billion) in 1990 prices, and the new town is to house a planned population of 176,000.

The development in the Chiba New Town area extends 18 km west to east and contains six subareas connected by railway and arterial roads. Each subarea is developed around one of the railway stations on the Line, and they are divided into several community units. Each community unit consists of a housing area, a school area, parks, hospitals, a commercial center, and other uses. The average land area of a community is 60 ha, with a planned population of 8,000 of population in 2,000 households. Various types of residential units will be constructed, ranging from independent houses to high-rise apartment units. High-density development is planned in the vicinity of the railway station, but density is to decrease as the distance from the station increases. Chiba New Town Chuo is designed to serve as a town center for the entire development area and is planned to accommodate a department store, government offices and cultural facilities.

There are 13 stations on the entire 23.8 km line, and the line now carries 26,000 passengers per day earning annual revenues of 1.5 billion yen (US\$14.2 million) from the operation of the railway. During the morning peak hour, the rail service is provided every 10 minutes. It takes 32 minutes from the town center to Keisei Takasago (east end of Tokyo), and 57 minutes to Nihombashi (center of Tokyo). The Hokuso trains are run by mutual agreement with the Tokyo Metropolitan Line and on another private line known as the Keihin Express to Kawasaki. Ridership has been steadily increasing since the opening of the first section.

Two railway development entities are involved in this project, Hokuso Railway Company (Hokuso Kaihatsu Tetsudo) and the Housing Development Public Corporation. Hokuso Rail

Company was established in 1972 as a third-sector company with joint capital contributions from the Keisei Group (Keisei Railway Company as the main company), the Chiba Prefectural Government and commercial banks. Hokusō Railway Company constructed and is operating the section known as the Hokusō Railway Line between Keisei Takasago and Komuro (19.8 km). The Housing Development Public Corporation constructed the so-called Chiba New Town Line between Komuro and Chiba New Town Chuo (4 km) but the operation of this section is the responsibility of the Hokusō Railway Company, which now operates a total route length of 23.8 km.

There are three distinct sections in terms of the methods of financing. In chronological order, the first section between Komuro and Kitahatsutomi (7.9 km) was completed in 1977 under the New Town Railway Construction Scheme. The second section from Chiba New Town Chuo to Komuro (4 km), constructed by the Housing Development Public Corporation, opened in 1984. This section is also supported by the New Town Railway Construction Scheme, with the Chiba Prefectural Government sharing the burden. The third section from Kitahatsutomi to Keisei Takasago (12.7 km), which will be opened in 1992, received support from the Railway Construction Public Corporation Scheme.

An agreement was also reached between the Transport Section of the Housing Development Public Corporation, as the railway operator, and its Housing Section, together with the prefectural government, as the land developer. This agreement allowed the railway operator to hold an interest-free deposit in return for the rail right of way; the deposit is not to be returned until the railway operator eliminates its cumulative deficit. The agreement also established a penalty in the case of a delay in land development that makes it more difficult to operate the railway profitably; the form of the penalty entails an additional subsidy and noninterest-bearing loan.

The Chiba New Town Project is an example of the construction of a railway system by a housing authority together with a regional government in order to secure public transport access of a new town to the Tokyo metropolitan area. Different entities have been involved in constructing sections on the same line. Further, the construction and operation of one of the sections involved two different entities in a way that effectively separated the tasks involved in developing a railway system. The project has been plagued with delays in the construction of the railway system, which in turn have discouraged potential residents from moving to the project area. However, recent land value increases in Tokyo have made a positive contribution to the new town development. With the recently-completed railway section providing direct access to the Tokyo city center, the prospects of the project are promising.

6. THE PROPOSED NEW JOBAN LINE

The urbanization of metropolitan areas gives rise to the development of new corridors connecting outlying areas with city centers. The proposed New Joban Line would radiate from Tokyo to Tsukuba Academic Town. The 60-km line would pass through the prefectures of Tokyo, Chiba, Ibaragi and Saitama and involve twelve local governments. Approximately one fifth of the line would pass through urbanized area and the rest mainly through hilly areas of wooded or agricultural land. The total construction cost is estimated

to be 1.5 trillion yen (US\$14.2 billion). The official plan for this line was initially prepared in 1985, but the method of implementation was not clearly devised at that time. The Japan National Railway or JNR (now Japan Railway Companies or JR) was first thought to be the implementing body. However, in those days JNR was preoccupied with the privatization process and no decisive action was taken.

The rapid increase in land values in the last several years changed the environment of the New Joban Line proposal altogether. Since then, two major actions were taken by central and local governments. The first action was the establishment of a "Special Treatment Act Relating to the Promotion of Integrated Land and Rail Development in Large Cities", commonly known as the "Integrated Development Act". The second action was the establishment of the implementing body.

Stable land development along the corridor is crucial for the railway enterprise to attract passengers in order to make the railway operation financially feasible. Land developers, on the other hand, require a good public transport system. Therefore, it is important to promote and establish coordinated rail and land development. However, the circumstances relating to the construction of New Joban Line are more complicated than those of the cases described above. The New Joban Line will be in a much longer corridor, involves a dozen of local governments, and is expected to involve a greater number of land development entities.

The Integrated Development Act was formulated by the Ministry of Transport, Ministry of Construction and Ministry of Local Governments to promote the process of integrated development. It refers to 17 Acts and makes specific amendments to 7 Acts concerning taxation, transport operation, town and country planning and other relevant areas. The Integrated Development Act passed the 114th Diet Session in March 1989.

There are three main aspects of this Act: First, it deals with the provision of power to prefectural governments to prepare master plans for integrated land and rail development. Such master plans specify the route of the proposed railway line and the location of stations as well as the type and size of residential and other developments. Applications for railway project licenses must follow these master plans. Second, the Act addresses the prevention of land speculation. The Act promotes the authority of local governments to intervene in land dealings within specific areas where integrated development is to take place. Third, it seeks to assure smooth coordination between land development and rail development. It is mandatory for land developers and the railway enterprise to organize a coordination committee and reach an agreement. The Act also allows entitled land and railway developers to procure in advance the land within the integrated development area, and propose to replot the land with the rail right of way. Finally, the Act authorizes local governments to provide assistance to the railway enterprise in terms of capital investment, financial subsidies and land acquisition. The local governments can also issue bonds to finance such assistance.

The prevention of land speculation is also important to reduce overall rail construction cost. Therefore, it is important to extend the "land price control area" in accordance with National Land Planning Act. Since November 1987, a majority of local governments have enacted

so-called urbanization promotion and control areas. All land dealings exceeding an area of 300 square meters within an urbanization promotion area and 3000 square meters within an urbanization control area are subject to these controls.

Another major action taken in March 1991 is that the four prefectural governments jointly established the implementing body in the form of a third sector company. There was a plan to transfer the management/operation to JR East after the completion of construction by this company but now it is expected that the third sector company will also manage and operate the proposed New Joban Line.

The construction cost of the initial phase of the project is estimated to reach 800 billion yen (US\$7.5 billion) including the cost of land acquisition. The local governments (4 prefectural government and 12 local governments) jointly invested 1.4 billion yen (US\$13.2 million) to establish the implementing company and the private sector is also expected to invest in the company, but most of the required funds will come from loans and subsidies from the local and central governments. However, no clear policy has been formulated as to how the required funds will be raised. The central and local governments are currently working to clarify the form and extent of their financial support. Other options are also being widely discussed. The following section summarizes some of these alternatives.

Three government-subsidies schemes, the Underground Rail Construction Scheme, the Rail Construction Public Corporation Scheme and the New Town Rail Construction Scheme, have been considered as potential sources of subsidies for New Joban Line project. There are some problems, however, in their application to the New Joban Line. The Underground Rail Construction Scheme, for example, does not apply to third-sector enterprises. Teito Rapid Transit or the Tokyo Metropolitan Government could construct the underground portion of the New Joban Line, but this project would have to compete with many other projects to be considered by these authorities and it is expected that the priority accorded the New Joban Line would not be very high. The Rail Construction Public Corporation Scheme could be applied if the Line involves an underground section and connects to the city center, but the order of construction cost would then be so great that it would be very difficult to fit it into the existing budget. The New Town Rail Construction Scheme applies only to rail projects that specifically serve for New Town residents and would therefore be rather difficult to justify in the case of the New Joban Line.

With the difficulties of applying the current subsidy schemes, the central government is considering the application of another form of financial assistance in the form of non-interest bearing loans to the project. The central government has established a fund for promoting the construction of main railway lines, based on the revenue from the transfer of Bullet Train Lines (*Shinkansen*) to the now privatized JR Group. The fund will be used to provide loans for constructing the New Joban Line. Currently, this scheme is to cover up to 40% of the total construction cost. The local and prefectural governments are also planning to financially assist the project by providing subsidies, investments, soft loans, and loan guarantees.

There are two main types of value capture methods under consideration. The first one involves the earmarking of local tax revenues, while the second involves levies charged

developers. A portion of the revenue increment from local taxes such as the property tax, the city planning tax, the business establishment tax and the corporate tax may be earmarked to raise the funds necessary for financial assistance to the railway developer. The property tax is considered to be the most appropriate tax for this purpose because it is relatively less complicated to estimate the tax revenue increment with this tax. Assessing levies to be paid by land developers through the development permit process is another way of transferring the development benefit. Kobe City has set a levy rate based on distance from the city center and the nearest railway stations on the line concerned, and a similar approach could be adopted in the New Joban Line project.

The sharing of construction cost is also an effective approach to reduce the financial burden of railway construction. Railway stations, for example, can be constructed by involving a private developer. The concept is for the developer to build the station and an office/commercial building above it. The cost of station construction is borne by the developer. In a similar manner, connecting passages between stations and existing or planned buildings may be financed by building owners with the understanding that increased access to the station will benefit the tenants, which in turn will benefit the building owners in the form of higher rent.

The privileged arrangement provided by the Integrated Development Act, by which the replotting in a land readjustment project can be implemented so as to secure the rail right of way, can be considered another form of value capture. In this manner, the rail developer can obtain the right of way cheaper than the cost it would have to pay otherwise.

Although the New Joban Line is still in the planning stage, some commitments have already been made by the central and local governments. The difficult aspect of this project is that the planned route involves a much longer corridor than the other examples shown in this paper, and involves a dozen local governments and a greater number of land development entities. The Integrated Development Act was enacted to ensure coordinated land and rail development, and a variety of financing methods are under consideration that would cover the line's estimated cost of 1.5 trillion yen (10.9 billion US dollars). This project, together with the other examples discussed in this part, presents a "showcase" of the ingredients necessary for successful integrated land and rail development.

7. INGREDIENTS FOR SUCCESSFUL INTEGRATION

The above case studies reviewed Japanese experience with integrated urban rail and land development. This section summarizes the basic ingredients and mechanisms underlying the Japanese examples. These factors can be discussed within socio-economic, physical and institutional environment.

Socio-Economic Environment

Urban Rail is Popular: In major metropolitan areas of Japan, the majority of passenger trips are made either by rail or bus. In Tokyo, 65.4% of all trips are made by rail, while the bus system carries 11.1%. The equivalent figures for the three metropolitan areas of Tokyo, Hanshin and Chukyou are 51.7% and 14.5% by rail and bus, respectively. This

indicates that the railway is the most convenient form of transport, and that traffic congestion and time value positively contribute to the patronage of urban rail, thereby increasing the development potential of land along rail corridors and terminals.

High Level of Service is Offered: The popularity of the railway system is supported by a high level of service, characterized by (1) frequent and reliable operations during peak hours and (2) an extensive network. During peak hours, major underground rail lines run every two minutes and the average waiting time is half of the headway. Assuming an average platform length of 200 meters and a walking speed of 4 km per hour, even if a passenger misses a train, the next train will arrive before he or she can move from one end of the platform to the other. Suburban railways offer a slightly lower level of service but their average headway is usually around 6 to 8 minutes. Although bicycles and private cars are also used as access modes to railway stations, feeder bus service is provided so that railway passengers can reach their destinations primarily by public transport.

Railway Development Increases Property Values: Because of the popularity of the system, railway improvements increase the property values along the corridor and particularly in the vicinity of the stations. Unyu Keizai Kenkyu Center (1988) analyzed residential land prices in the Tokyo region and found that distance to the nearest railway station was one of the most important factors explaining land values. Integrated development by private railway companies partly relies on this factor and some publicly or semi-publicly owned railway enterprises have experience in applying this mechanism to cross-subsidize railway improvements with the extra benefit derived from increased property values.

The Private Sector is Actively Involved in Urban Transport Provision: In the Japanese examples, the private sector played a major role in land as well as transport development. The well-developed private sector in Japan is an essential ingredient for successful integrated development.

The Urban Economy and Property Market is Expanding: The existence of a strong property market is important because it ascertains the profitability of property development, which in turn, strongly affects the viability of the integrated development.

Physical Environment

An Underdeveloped Corridor Exists Close to the City Center: Many private companies in Japan obtained land for development well before they constructed their railway system. The area was usually underdeveloped so that the land prices were relatively low, enabling developers to earn large profits. The developed land is usually within 20 to 30 km (i.e., commuting distance) of major employment centers. The Den-en-Toshi project and the new town development in Kobe were both in this kind of regional setting. The Chiba New Town and New Joban Line have been slightly handicapped in this regard, necessitating public sector involvement in establishing the implementing body.

High-Density Development to Create Passenger Demand: Land development creates new demand for urban rail service; in this regard, high-density residential and commercial

development in the vicinity of stations is particularly important to increase rail ridership.

Terminal Development to Capture Benefits: Terminal developments are particularly profitable when the developed system can attract many passengers. Department stores, shopping plazas, office buildings and entertainment centers are typical forms of terminal developments. As was shown in the Japanese examples, railway enterprises with terminals in the city center have a big advantage over those without.

Diversified Development to Create Reverse/Off-peak Flows: Traffic generators should also be established to equalize the flow of passengers in both directions and during peak and off-peak periods. Addressing this problem becomes easier if rail and land developments are coordinated. The distribution of urban passenger trips over time and space is characterized by distinctive patterns depending on trip purposes. Therefore, diversification of land use activities (e.g., by commercial development in and around the stations, construction of facilities such as schools and hospitals in residential areas and theme parks elsewhere in the corridor) is also important. Diversification of activities enables the capture of some of the value associated with the variety of commercial and other opportunities created by the rail service. By the same token, constructing a railway line connecting two major cities assures balanced demand; for example, many Japanese railway companies have built railway lines between the cities of Tokyo and Yokohama or between Osaka and Kyoto, and have developed the land along the corridors as well as the terminals.

Institutional Environment

Efficient Administrative Infrastructure to Support the Transfer of Benefits is in Place: An advantage of integrated development in Japan is the existence of a benefit transfer mechanism supported by administrative guidelines and taxation and subsidy policies. An efficient administrative infrastructure is required for successful value capture, particularly when railway construction and land development are undertaken by separate entities.

Subsidy Schemes and Low-interest Loans are Available to Finance the Project: Various subsidy schemes provided by the governments have reduced the financial burden of railway operators. Local governments also could invest in railway development and provide low-interest public loans to railway operators.

Legal Framework Supports Integrated Development: Governments played an important role in establishing the legal framework necessary to assist in the smooth transfer of a part of the development benefit to the railway operator. In one example, the City of Kobe established guidelines requiring developers to transfer a contribution to the railway operating body. In another example, the central government enacted the Integrated Development Act to promote the realization of New Joban Line Project.

A Choice of Implementing Bodies is Possible: There are three major forms of implementing body of railway construction/management and land development: (i) the public sector (governments), (ii) the third sector (semi-public), and (iii) the private sector. Depending on the situation, the forms of implementing body that can best increase the viability of the projects can be selected.

Projects are Supported by Policy Coordination: Protection of the public transport system is sometimes necessary. Private lines in the Tokyo metropolitan area are granted competition-free territories. As a consequence, excessive competition is prevented by regulating new line construction and route allocation, although the situation is slightly different in the Hanshin area. Within the same territory, buses are usually operated by the same company or by its subsidiary. Therefore, the network is organized to reinforce each system rather than to expose the two systems in competition. If different entities operate railways and buses, it is recommended that the governments coordinate network reorganization along the railway corridor. The example of the New Joban line indicated the necessity of policy coordination among the transport sector and the land use development sector. Such coordination is particularly important when the planned railway line is spread over more than one administrative boundary. Although reference was not made to it in the examples, policy coordination may be required to restrain private cars and encourage people to use railways.

Inter-Agency Cooperation Based on a Long-term Strategy Has Been Established: A joint urban rail and land development scheme also requires cooperation among governments and many other organizations. Such cooperation should be based on a long-term strategy because of the length of time it usually takes to capture a significant share of the external values generated by the provision of improved rail service.

8. CONCLUSIONS

This paper examined a viable process for achieving coordinated development of land use and transport systems with specific emphasis on experience gained in Japan concerning urban rail and land development. This approach incorporated private sector involvement, and the notion of transferring (or capturing) part of the financial benefit gained from the land and property development to the transport operating entity; this approach also secured demand for the transport system. Five case studies were described together with an analysis of factors contributing to successful land use and urban rail development within socio-economic, physical and institutional environments. Most of the factors identified in this paper embody the necessary ingredients for successful integrated development in Japan, but the concept can be transferred to other cities outside Japan. Such applications have been studied in Bangkok (Tsukada and Kuranami, 1990) and in Jakarta (LPTD, 1991), and the applicability of the concept to developing countries is reported to be promising. Finally, the concept of joint development introduced in this paper can be applied similarly to other forms of public transport. The mutually reinforcing interrelationship between the public transport system and land development, however, may not be as great in the case of nonrail-based systems because of the lower traffic and capacity of these systems.

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