

A STUDY ON THE STATION FACILITIES AND ITS FUNCTION FOR SUBURBAN RAILWAYS

- A CASE STUDY IN TOKYO METROPOLITAN AREA -

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abstract: The purpose of this paper is to find the future prospects of station facilities and their related functions to the local community and the financial resources to be prepared for the development of suburban stations in the Tokyo metropolitan area.

1. INTRODUCTION

Over the past decade, a considerable number of studies on the function of railway stations and financial resources for railway constructions have been carried out in Japan. There are many projects in progress related to the railway system in Japan. For urban railway developments, the projects most needed are the construction of the New Joban line, new subway lines, and extensions of existing railway lines, and development of new stations in the Tokyo Metropolitan area.

There is a strong public demand for a variety of projects related to railway station facilities. However, consideration to passenger utility has been minimal in most of the existing station facilities. The problem of their business profitability has been the biggest obstacle to the expansion of such facilities. The financial problems of railway companies make it difficult to construct new railway facilities due to the increase of costs. In addition to this, the development of station facilities has not been included in urban development projects.

The purpose of this paper is to consider the future prospects of station facilities and their related functions to the local community and the financial resources to be prepared for the development of suburban stations in the Tokyo metropolitan area. This study is intended to develop ideas and methods, rather than to prove facts in a final and determined manner.

The results of this study can be separated into three main parts. First, discussion and analysis are focused on railway station facilities and station design. What the future requirements for railway facility developments should be was the object of the questionnaires. The information was obtained through questionnaires addressed to university professors, specialists in charge of urban traffic facility planning and railway constructors, then a station of new concept was designed by the introduction of CAD (computer-aided design system). Second, we studied the benefits of station construction. Finally, detailed information on financial resources were collected in the case of the development of some existing stations,

and we tried to find efficient measures for construction of station facilities. The above points of discussion are applicable to the development of station facilities in Kashiwa city on the New Joban line.

2. STATION FACILITIES AND THEIR FUNCTION

2.1 Concept

This study examined three basic concepts indicated in Figure 1: (1) Creation of a good relationship between the station and the town, (2) Provision of New Cultural effects, and (3) connection with other transportation systems.

The concept of how to create a good relationship between the station and the community is to give the station community identity as a city landmark and strengthen the functions of station facilities so that local residents and visitors will find them user-friendly and accessible.

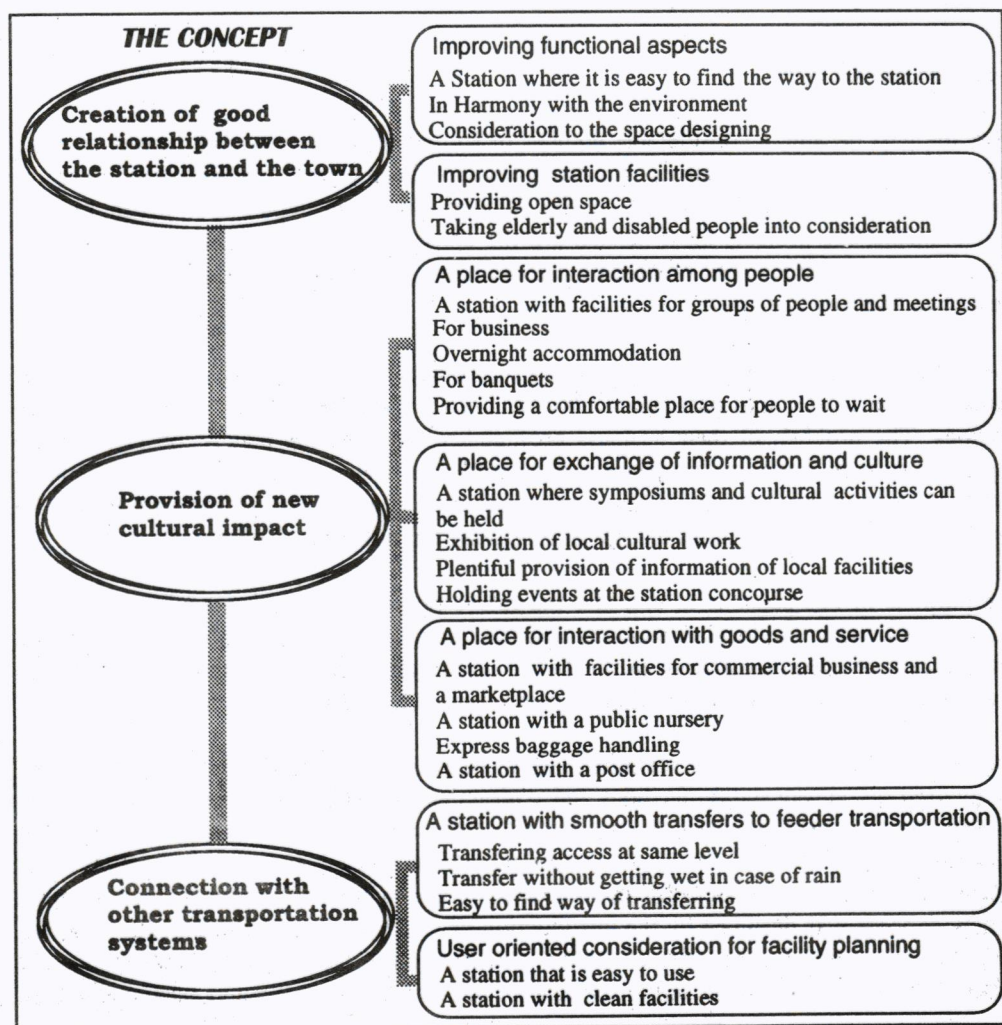


Figure 1. The concepts of the function of the station

The question of how to provide the new cultural effects means designing a station able to provide a chance of exchange between people, things, and information by improving its ability to attract users, by making a cultural contribution to the region along its railway line, in order to promote new development of the cities where the stations are located. Connection with other transportation systems and improving convenience for users by facilitating easy and smooth transfers to other lines and means of transportation are important roles of a station as a transit point.

The information in Table 1 was obtained from the results of the interviews conducted with 15 specialists, asking about the above concepts and their elements in the order of greater importance. Aspects regarding a good relationship between the station and the town and connection with other transportation systems, which intend to improve the user oriented functions of a station, have received the highest scores.

Table 1. The concepts appeared in the interviews

	points
A station with smooth transfers to feeder transportation mesns	53
Improving functional aspects	50
Improving station facilities	40
User oriented consideration for facility planning	27
A place for interaction with goods and services	17
A place for interaction among people	13
A place for exchange of information and culture	10

2.2 Preferable functions

A hearing was made by sending the questionnaires concerning the most desirable functions of the station facilities to be developed in the future, according to the established levels of demand for public / public service facilities, commercial facilities, and facilities at traffic transition which will become necessary according to the level of demand in the future.

The first question in the questionnaires was to ascertain desirable locations of the listed facilities. Figure 2 indicates the results. These facility sites are categorized as follows: A) the

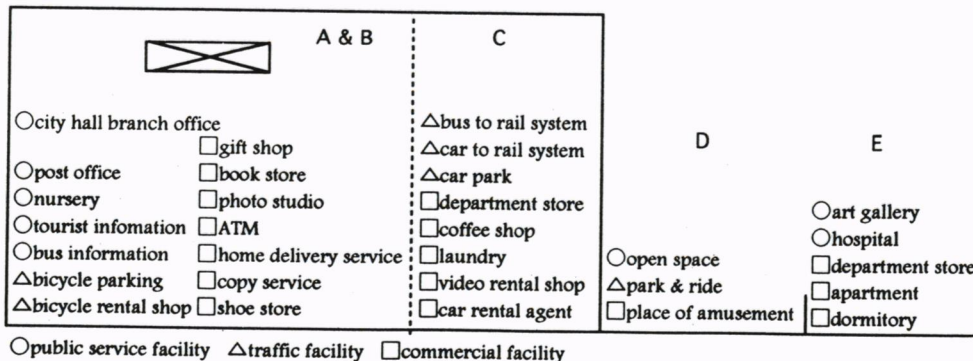


Figure 2. Preferable location of the station facilities

area above the railway tracks, B) the area under an elevated station, C) the area beyond a railway and in the vicinity of the station, D) the station plaza and its outskirts, E) within the land readjustment zone, F) not necessary to locate near a station, and G) completely unnecessary.

Figure 3 indicates the result of an allocation of these facilities by the progress of stages according to the levels of demand. The estimated passenger volume at the initial stage immediately after the station inauguration is 18,000 persons a day and 50,000 persons a day at the final stage. Therefore, an agreement was made on the scheme of the construction of the facilities to construct facilities that play a leading role in the city development plan, like public service facilities at the initial stage and to construct commercial facilities in accordance with the development of the city.

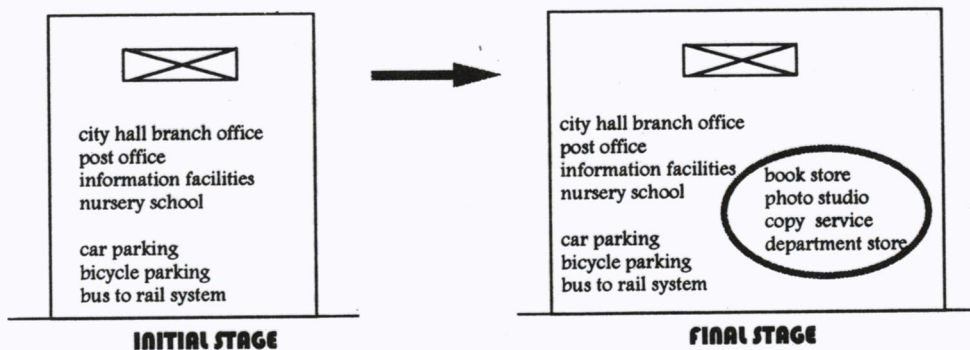


Figure 3. Desirable allocation of the station facilities developed in stages

In the following section, the benefits from the improvement of these facilities will be discussed. First, a direct benefit for the station user is the effect of the reduction of expenditures by the development of multi-purpose facilities. By the allocation of the facilities such as municipal branch offices, post offices, and child-care facilities concentrated in the same area, it will be possible for the visitor to these facilities to save trips and time due to the scattered locations of the facilities in the past. According to the calculation of this study, the effect of this facility allocation will save approximately ¥ 400 million of expenditure. Further, it will be possible to improve on the time and trouble in transferring by designing the station and its transit facilities in vertical configuration and organizing a traffic square within the area of the railway operators' property. A time-saving effect of about ¥ 1 billion will be created if the bus stop and car transit point could be relocated 30 meters closer to the station. It is believed that the flexibility of station plaza designing will be remarkably enhanced, if railway operators' property can be used for station plazas

Further, in addition to the direct benefits such as improved convenience and amenities, indirect benefits such as the increase in residents and promotional effect for construction of facilities in the surrounding area, increased attraction for users, and the enhancement of the community's images can be also expected.

3. STUDY ON THE METHODS OF STATION FACILITY DEVELOPMENT

This section will focus the results of the study on the methods of development of station facilities. The appropriation of funds for construction and how to obtain the land required for the construction of related facilities were the matters of primary concern. The study on the space design for station facilities and on their legal structures were made by dividing them into three types indicated in figure 4.

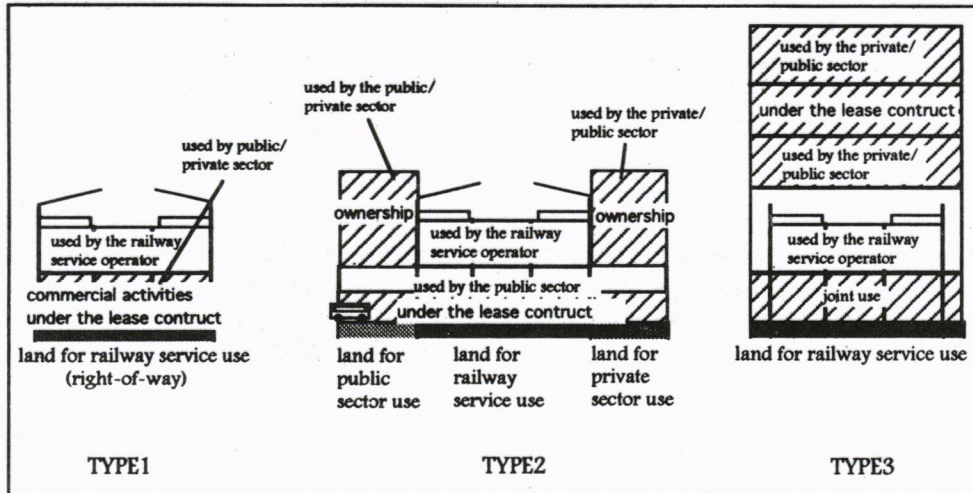


Figure 4. Type of space design for station facilities and relating legal status

Type 1 is a design to use the existing specification for station designs and the spaces for station facilities are allocated under elevated stations. In this case, construction expenses will be low, however, there are some problems such as the restricted flexibility in function and the limited open space due to the big supporting pillars.

In the case of Type 2, it is designed to scatter the location of station facilities in immediate vicinity of station. A site for the station facilities should be reserved in advance in the land readjustment program as reserved land for a designated use. Because of the meritorious characteristics of this type of design, the variable planning in accordance with the stages of development of the community is acceptable. The space in the first floor of a station main building and the related facilities can be utilized as a space for a station plaza.

Type 3 is a design that allows highly efficient use of the space above the land for railway services and can provide spaces for related facilities. These facilities, which are not scattered but located in the same district, can be used together, and in addition to that, the station can serve as a landmark of the community. However, it has demerits which require much stronger supporting pillars and much more construction costs in addition to the difficulty of acceptability of the development depending on each stage.

Figure 4 is a graphic presentation of the type of design with the relating legal proceeding. There is a restriction under Article 4 of Railway Mortgage Law that the rights for use of the space above or below the railway tracks can not be registered legally in the case when it is intended to develop railway facilities in the space above or below the land for railway service use.

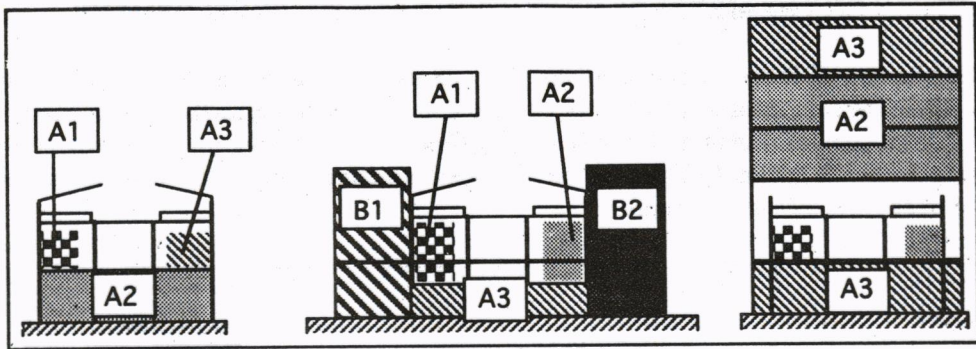


Figure 5. Examples of the application of the methods of station facility development by type

A study was conducted on the above mentioned methods of the development of station facilities under the framework of the designs and legal proceedings shown above. The methods of construction in the study can be roughly divided into two categories. One is a method to consider construction of the facilities only, the other contains the reservation of land for the related facilities use as explained in type 2. Henceforward these will be referred to as Type A and Type B respectively.

Type A can be classified by the organization carrying out the construction; railway enterprise operator as A1, private sector enterprise as A2, public sector as A3.

Type B can be classified by the organization carrying out the construction, public sector as B1 and private sector as B2. Figure 5 shows the illustrated examples of the application of each construction method by type.

In the case of A1, the intention is to restore the construction expenses by giving the public / private sector the right to use the facilities after the railway service operator has completed the construction. When the size of the project is so big and burden of the railway service operator is also great, it is necessary to introduce a system like benefit sharing. A2 and A3 are the methods that the organizations with the rights to use the facilities develop the station facilities and the railway service operators give the rights to use the facilities free of charge or at very low rates.

In the case of B1, the land adjustment to the station building in designated as reserved land or a land for public use and the railway service operator constructs public service facilities in accordance with the growth stages of community. B2 is the method to sell the land required for station facilities to private sector and the private enterprises construct the facilities. In the case, it will be required to make necessary instructions to the private enterprises to meet the requirements of use of land by the public sector. It will be also required to evaluate their "contribution to the Town Planning" in order to make an incentive to operate commercial business.

In this study, it is concluded that Type B is the most desirable construction method to be adopted, taking the following factors into consideration: the reservation of the land required for facilities, the coordination between the project participants with regard to their rights,

and the applicability of construction according to the stages.

4. CONCLUSION

(1) Discussions were held and analyses were made to find how to design station facilities. The hearing was conducted by sending questionnaires asking which developments of station facilities were hoped for in the future. The questionnaires were answered by university professors, specialists in the field of urban traffic facility planning and railway constructors. Then, a new concept of station facilities was designed by the introduction of CAD. Figure 6 is a graphic presentation of type of design for station facility development.

(2) Detailed information on financial resources provided for the construction of existing stations was collected and a new concept of measures for station facility development was presented.

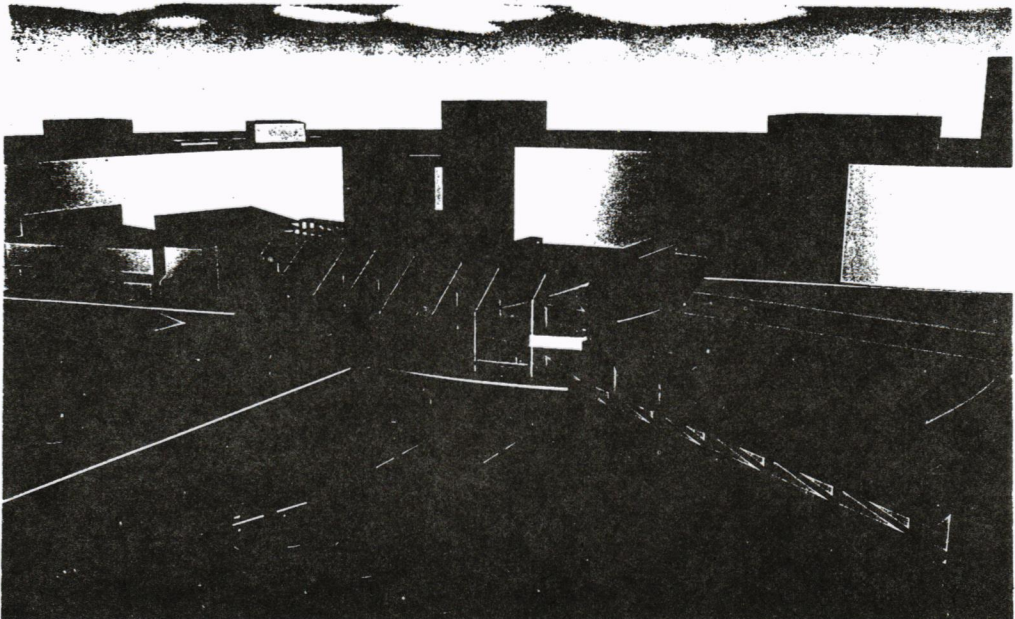


Figure 6. Graphic of the station

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