

**H-051 Proposal for Package-Type Transportation Measures Based on
Public Transportation toward Reduction of Environmental Load (Abstract of the Final
Report)**

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【Abstract】

This study is regarding the way to introduce LRT(Light Rail Transit) as a environmental friendly public transportation, with 4 sub-themes like a technology, an introduction effect, a financial and legal system.

The constitution of the sub-themes for the research theme realization

- (1) A traffic measure in the advanced city and a study about the traffic action
- (2) A study about the package type traffic measure for the environmental load reduction
- (3) A study about the effect inspection by the LRT introduction
- (4) A study about the legal and financial system to promote LRT introduction

1 . Introduction

In the various cities in the world including our country, are facing urgent needs to be gone ahead through the switch to environmental friendly public transport from the auto traffic use as an executable effective CO2 reduction measure to win. This research theme LRT (Light Rail Transit) : Low floor model streetcar) investigates the examples of development / developed nations firmly established in and performs the effect inspection that assumed LRT introduction to construction or Kyoto-City of a model predicting influence on environment of the measure and the activation of the city and suggests a measure to relate to technology to introduce the environmental friendly public transport of our country, finance, a legal system, education service as a package type traffic measure.

2. Research Object

The purpose of this study is showing, the effect that the introduction of the public transport package including LRT gives the environment (CO2 discharge) and activation of city, finance and system to introduce LRT in our country, based on the example of the advanced introduction country of LRT

3. Research Result

3.1 Study about traffic measure and traffic action in the advanced city

(1) A study method

LRT (Light Rail Transit) in the European and American advanced city : we investigate a field work about technology / a system about public transport such as low floor model streetcar), reporting for charm improvement and use promotion of the public transport and the building civic consensus and documents and am aimed at analysis arranging information becoming useful on the occasion of introduction to our country. And we suggest technology / systems such as LRT suitable for the city structure of our country, the combination of the service standard as a package type traffic measure. Furthermore, we carry out investigation about the civic consciousness / traffic action transformation at the time of the LRT introduction as well as a field work and documents investigation and consider it about the reporting / agreement formation plan at the time of the LRT introduction in our country because grasp analyzes citizen's LRT consciousness / manner for the public transport.

In addition, it followed a questionnaire before the LRT introduction that we carried out in 2005 and carried out a household after the LRT introduction and a questionnaire to the user in Mulhouse (France) and Toyama-City and performed analysis about an environmental awareness / the manner of a citizen / the user and considered a difference with consciousness change and France and Japan of LRT introduction before and after.

(2) The summary of results of research

1) About a trend of the LRT maintenance in France

In France, U.K. and U.S.A. were once similar, and the removal of the streetcar advanced with development of the motorization in most cities. However, in a flow of the public transport restoration after 1970's, LRT introduction occurs successively as a start in Nantes of 1985, and it becomes travel LRT now in 21 cities (before 1999) : Five cities, 2000-2007 years : 16 cities). In addition, furthermore, LRT is going to be introduced in six cities and, after 2008, presents an active state. In addition, the maintenance of the belt line by LRT is going in Paris, and overhead wire which considered a sceneless LRT (a battery run) introduction is pushed forward in Nice, and it is supposed the movement that is advanced with an urban traffic plan and an aspect of the vehicle technology.

2) About LRT introduction technology

Development is seen in the technology of LRT at energy supply, the point of the run method. By the energy supply, a stage of the enforcement service already contained a collection of surface of the earth electric method (France / Bordeaux), a battery method (France / Nice). A request from the scene maintenance of the historic district is strong both. An experiment is started at the end of 2007 in Sapporo-shi, and the battery method will become a convincing method in a domestic city planning introduction of LRT. On the other hand, by the run method, there is the city where a rubber tire method is introduced into in substitution for an iron ring. It was introduced recently in Clermont-Ferrand (France) in 2006. By the comparison with the iron ring, there are the good points such as low cost, climbing ability, too, but there are the weak points such as ride comfort, rootlessness by no rail, too. It is necessary to choose it after having been based on an interest loss and gain enough to introduce it in our country.

3) About city structure and an LRT route

For French Strasbourg, Mulhouse, I analyzed an LRT route and a relationship with the population density /

aging rate. As a result, at first, about the population density, a TRAM route was planned so that both cities went along the area (more than 30 almost, / ha) where the population density of the city was high together, and, as a result, I was big, and improvement on the environment side by the switch to the public transport understood what I contributed to from improvement and a car of business profit characteristics by the inducement of many users. About the aging rate, it was it with the structure that aging rate was high next in the suburbs part from a center with both cities, and an LRT route was got ready in form to bind the suburbs region and core city region concerned together, and it became clear that even the aspect of the social welfare called the movement of the senior citizen played a constant role.

4) About an environmental awareness / a manner / action transformation

By the investigation (Mulhouse, Toyama) about the civic consciousness / traffic action transformation at the time of the LRT introduction, LRT introduction let you cause the change of the environmental awareness, and knowledge to show a tendency ahead of the car use was provided. In addition, it was comparison only for two cities, but action transformation compared it with Japanese it consciousness / attitude toward European citizen's environment, and we was big, and the knowledge that we advanced to was provided. Ridership of European LRT compares this with the domestic city having a streetcar in the same way, and it is thought with the factor of the one of much more results.

5) About building civic consensus process

We performed documents investigation and local hearing about the structure of the French citizen participation / building civic consensus process. There is the political factor to complete LRT all over the term in office of the chief in the background in France, but the agreement formation of the society is effective, and, by prior consultation (Concertation), a citizen participation procedure such as the public examination, it is thought that what is performed effectively contributes. When you raise accountability and the transparency of the public works project in our country, information disclosure is commonly used, but may not expect an effect, as a result, to be connected for shortening between the building civic consensus periods and reduction of suit after the fact by planning communication with the citizen like prior consultation (Concertation) more positively than from the initial stage of the plan? In addition, it is a procedure an examination committee elected by an administration court of law hears a citizen's opinion as for the public examination, and to submit an examination result to the assembly and can be superior with an aspect of neutrality / the equitableness. It is thought that the structure of the public examination that is an evaluation system by this third person is a system to deserve reference in our country.

3.2 A study about the package type traffic measure for the environmental load reduction

(1) A study method

To analyze the influence that the introduction of the public transport package measure including LRT gives the environment (CO₂ discharge) and activation of the city, we build a transportation modal choice model and a traffic simulation model in the city. In addition, we clarify a measure suitable for the national traits of our country, climate, city structure by analyzing traffic measures such as maintenance of LRT, transit lacing braid, a park and ride, the road-pricing, and maintenance and environmental safeguard of the traffic convenience suggest the package type traffic measure which can live together more.

Making Hiroshima-City an example, we built the analysis frame which we put it together, and measured an effect, therefore, to produce of traffic measures such as transit lacing braid, a park and ride, the road-pricing. Furthermore, even a package type traffic measure performed the change of the effect by the combination of the carrot and stick measure, adaptation to the package measure to plan substantiality of the traffic in the city again. In addition, for a maintenance effect of the light rail, we intended for Toyama light rail and, in July, 2007 that passed, we carried out questionnaire survey to the user according to a weekday / a holiday and we waited for the use actual situation of LRT, a choice reason, a change of the use frequency of the going out number of times / the car of LRT maintenance front and back, a scene, turnout of the gadget, environment and investigated one year about an effect to the making of from commencement of practice.

In addition, we examined the economic value by asking the amount of total payment will for LRT in particular. Furthermore, we asked it by 5 method and we used a factor analysis and, about influence on "city image" in maintenance front and back of the Toyama light rail, evaluated concrete 19 items to relate to convenience, comfort, safety, a sustainability (vigor).

(2) The summary of results of research.

At first no charge of a park and ride parking lot put increase in the number of flights of railroad number, service of a feeder bus together as a measure equivalent to candy among measures of a carrot and stick of a package measure by an application to an inconvenient area of transportation service about a study about a prospective effect by introduction of a package type traffic measure. As a result, it followed that synergy was provided by a pattern of a measure because the thing that an effect of a measure was offset made a measure of addition a package when we did not include a package measure of these addition.

In addition, as adaptation to a package measure to plan substantiality of traffic in a city, we intended for an area of Hiroden of the Hiroshima-City western part and performed analysis to relate to maintenance of LRT as shortening in time of downtown area access. In the place that each measure effect compared with maintenance of LRT, this analysis area for, that transit lacing braid and LRT maintenance were the combinations that were effective as package approach was confirmed, and, as for the effect, that the effectiveness of a package measure was high in promotion of the railroad use and a meaning to say was confirmed by the thing that was bigger than an effect of an LRT maintenance simple substance.

Most were old JR Toyama Port Line, people of switch from a parallel bus route, but a shift from a car was watched, too, and, as for the user of Toyama light rail, niceness characteristics were made much of as well as convenience for a choice reason of LRT, too. There was the user who let we reduced the use number of times of a car after maintenance of LRT and going out frequency increase, and the tendency was particularly remarkable in a freedom purpose of a senior citizen. Furthermore, high evaluation was shown in improvement of a scene, a symbol of waiting, an effect to the making of gadget which we called barrier-free improvement. In addition, about value of LRT, that indirect value of the amount of uniformity was recognized as well as direct utility value (the amount of fare payment) than the amount of provided total payment will was suggested.

Furthermore, as a result of, about influence to a city image with introduction of Toyama light rail, having applied factor analysis to five phases of answers for 19 items; convenience (five items), a sustainability (vigor of waiting) : we extracted five items), safety (two items), four factors of comfortable sex (seven items), and each factor score understood that influence degree was high in order of 0.72,0.67,0.58,0.46. An effect by LRT introduction was high, and, about a sustainability (vigor of waiting) and comfortable sex, the structure that was

finally connected in attachment to Toyama and consciousness to want to continue living was confirmed in particular. we measured an effect we "held attachment, and to continue living" that was an effect from the many sides with LRT introduction and an important problem to have of a city, and what we exhibited suggested possibility to promote the building civic consensus for introduction in the other city.

3.3 A study about the effect inspection by the LRT introduction.

(1) A study method

In order to analyze having changes or not such as action on the traffic of inhabitants and the consciousness at the time of the transportation modal choice in LRT introduction before and after, we took up Toyama of French Mulhouse (SITRAM) and our country where LRT was introduced into in 2006, and analyze the presence of changes such as the consciousness at the time of the transportation modal choice and carried out spot questionnaire survey for the resident of both cities and analyzed the traffic action of the inhabitants of LRT introduction before and after about a change of the consciousness at the time of the transportation modal choice in particular.

Furthermore, use an above-mentioned questionnaire result; and Analytic Hierarchy Processes (Analytic Hierarchy Process) : AHP) and Contingent Valuation Method (Contingent Valuation Method) : we measured it about the amount of total payment intention for LRT and the value constitution quantitatively by putting CVM) together.

About the influence that the LRT introduction was long-term, public transport allotment rate and the public transport staff of Japan and each German city analyzed how the difference changed again with progress in time whether there was a difference by presence of LRT.

(2)The summary of results of research

1) Prior afterward investigation in Mulhouse / Toyama-City

From a result of a feasibility study / the afterward investigation in Mulhouse / Toyama-City, even in a point in time when only one year passed after commencement of practice, there is a possibility that the enforcement of the traffic measure in various cities to do including LRT introduction changed consciousness itself for the transportation modal choice of the LRT introduction in-tower, and it developed that city resident after the LRT introduction chose public transport significantly even if we showed the same traffic condition like a case of having LRT introduction or not

2) The amount of payment intention for LRT.

As a result of having calculated the amount of total payment intention for LRT and the value constitution quantitatively, a difference was watched greatly by a place of residence in Toyama by WTP, but it was it with about 2-10 times of the amount of fare payment, and the value that LRT introduction brought indirectly was very big, and, as for the big difference by a place of residence, what was not watched, the total sum of value except the amount of fare payment clarified what was evaluated in Mulhouse quantitatively.

3) An LRT introduction effect in Germany

Regarding long term influence of LRT introduction, allotment rate of the public transport in German city where introduction of LRT had been planned for 40, was bigger than Japan, and the tendency that the difference becomes bigger is clear in the city where LRT is introduced into.

In addition, the tendency that a difference comes out to the public transport volume by having LRT or not with progress in time is clear

3.4 A study about the legal and financial system to promote LRT introduction

(1) A study method

On the basis of the results of research of the past fiscal year that motorization gave decision of city structure such as the suburbanization of the city big influence, we classified spread of public transport promotion plans in public transport promotion plan, as the part of the comprehensive transport system which internalized external diseconomies of the public transport use promotion plan ,② auto mobility as the part of the ,① compact city formation policy.

For two types mentioned above, we added an edge city model, the theoretical examination that were based mo on the city economics such as the theorems of the ring.

With that in mind, we collected an overseas example about congestion taxes and examined feasibility in our country and suggested a feasible policy package.

In addition, we took up an example of Paris and Toronto to extract a role and the problems of the integrated administration of a large region organization.

(2) The summary of results of research

Considering the economic public welfare of inhabitants of the whole city, the guarantee to be favorable does not have city structure called the compact city about all cases

If decision of desirable city structure for foresight is not possible, it should be established a comprehensive transport system internalizing external diseconomies of the auto mobility, and it is desirable to perform support for the public transport as the part.

It can be supported the measures such as the expansion of the capacity for highway that assumed congestion tax a source of revenue theoretically, and, for an overseas example, congestion tax and a beltway, Dennis package of Stockholm that put maintenance of the public transport of the downtown area together, the congestion tax of London are useful.

The beltway of the urban area unit that assumed a tax increase for the local rates of the road source of revenue for specific expenditure a source of revenue when we thought about the realistic application in our country, the enforcement of the comprehensive transport system measure including the public transport maintenance of the downtown area are desirable.

In addition, there is much construction of the regional administrative organization which was able to ask for the frame of cities, towns and villages as a frame of the policy to secure the enforcement of such a comprehensive transport system measure as an example, and, in the OECD countries, it is watched. Wide fields such as the road administration that was able to ask for them, public transport administration, road safety administration are included to correct an evil of not only regional administration division but also organized division (so-called vertical administration system) at those organizations.

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