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The National Minimum Standard on Transport Services of the Road Infrastructure's Accessibility

KRIHS Korea Research Institute for Human Settlements

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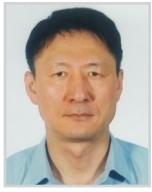

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Chapter 01

Introduction

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Introduction

1. Statement of Issues

Transport infrastructure including roads has achieved a remarkable quantitative and qualitative growth with the gradual establishment of the arterial road network thanks to the government's constant investment policies. This transport infrastructure has fulfilled its roles and duties as a critical infrastructure that drives the growth of the national economy and has an enormous influence on the daily lives of the people. However, the improvement of transport services has strongly focused on quantitative expansion instead of qualitative improvement. Moreover, several regions of the country have been lack of transport service due to their geographical locations or other reasons while the quality of transport service has been somewhat out of interest so far. These days, in particular, the government is reviewing and discussing diverse welfare policies with strong interest from the people. But the road transport sector has been lack of status analysis and service evaluation from welfare perspectives.

Meanwhile, the government has recently spurred its efforts to improve the quality of transport services going beyond the previous quantitative expansion and to establish the basis of transport policies from welfare perspectives. As an example, the government has made a preliminary announcement on the 'Legislation (Proposal) of Framework Act on Transportation', which is based on the 'right to transport' meaning that the people have the right to receive universal transport services and use such transport services in a safe and convenient manner to move from one place to another. This represents the government's strong commitment to addressing the people's right

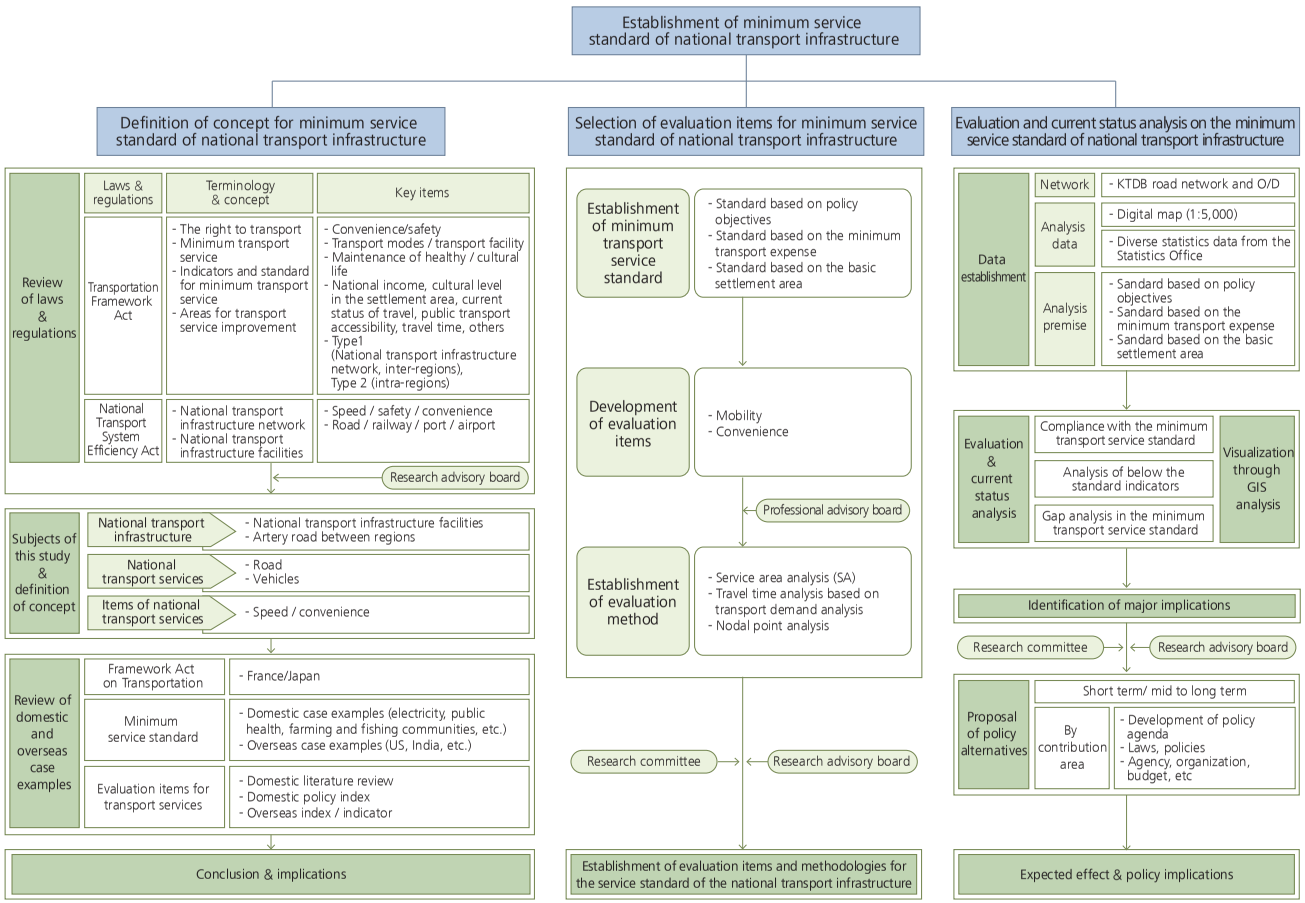
to transport as one of their basic rights such as the right to food, clothing and housing. It also shows the government's determination to actively prepare relevant policies at a government level. In this regard, the government's efforts bear a significant meaning that signals the emergence of an important paradigm in transport sector.

In order to systematically establish the 'right to transport' as the basic right, the first and foremost task is to evaluate the current transport service, after setting the standard and indicators for the 'minimum transport service' that is required for the people to lead a healthy and cultural life. However, the government is proceeding with the Legislation Proposal of the Framework Act on Transportation without any overall research or correct definition of the concept, let alone the relevant study. This further raises the urgent necessity to define the concept of minimum transport service standard and develop specific evaluation items and methodologies to actually set and measure the minimum transport service standard.

Against this backdrop, this study aims to present implications to be considered for transport policy. To this end, this study defined the overall concept and evaluation items as well as methodologies for the minimum transport service standard, and analyzed the current transport services by category, focusing on the road transport infrastructure among the transport services that are closely related to the daily lives of the people.

This study first established basic data related to road infrastructure among the national transport infrastructure as of 2010. Main focus of the study is to define the basic concept, review domestic and overseas case examples, establish the items and measurement methodologies for the minimum service standard of national transport infrastructure, and propose policy implications. The main study procedure is as follows.

Figure 1 Study Procedure



2. Basic Concept & Evaluation Items

1) Basic concept

The right to transport refers to the right of the people to travel in a free, convenient and safe manner, including the right to walk, the right to travel by bicycle, the right to travel by public transport, and the mobility impaired people's right to travel. It also encompasses the citizens' right to travel, the right of freedom to choose transportation modes, the right to choose freight transportation modes, and the right to access transport information.

Table 1 Concepts Similar to the Right to Transport

Similar concepts	Laws & regulations	Content
The mobility impaired people's right to travel	「The Mobility Enhancement for the Mobility Impaired Act」	- The mobility impaired people including the handicapped have the rights to pursue human dignity, value and happiness. This includes the right to travel by using all types of transportation modes, passenger facilities, and roads that are available for non-handicapped people in a safe and convenient manner without any discrimination. - The government and municipalities must establish and implement a policy to ensure convenient usage of transportation modes and passenger facilities as well as the improvement of pedestrian environment in order to help the mobility impaired people travel in a safe and convenient manner.
The right to walk	「Pedestrian Safety and Convenience Enhancement Act (Proposal)」	- The right to the protection of life and body in the pedestrian environment, and the right to walk in a pleasant and comfortable manner without being exposed to various pollutions including noise and air pollutions - The right to fulfill the desire to walk and lead a healthy life by walking - The right to claim safe and convenient pedestrian environment - The right to propose opinions and receive information about pedestrian policy and relevant projects of the government or municipalities
The right to use public transport	「Act on the Support and Promotion of Utilization of Mass Transit System」	- The Act declares that "all people have the right to use public transportation modes in a convenient and safe manner without any unfair discrimination in receiving the public transport services."
The right to travel by bicycle	「Promotion of the Use of Bicycles Act」	- The Act aims to promote safety and convenience of bicycle users and contribute to wide use of bicycles. - The government and municipalities should prepare comprehensive measures to promote the use of bicycles, such as enhancing the repair/ maintenance of facilities for bicycle riding as well as the safety and convenience of bicycle users.

As one of the basic rights, the right to transport encompasses the right of freedom and social right. The right of freedom refers to the individual right to the freedom to travel, which is a passive right to be just free from the intervention of the government. However, the social right is an active right to claim compensation when the right is not fulfilled. Some say that, if the nature of the right to transport is more of a social right, the public may demand compensation from the government when they think that their rights to transport are not fulfilled, as described in the Framework Act on Transportation.[1)]

Table 2 Significance of Ensuring the Right to Transport

Classification	Content
Meaning of the right to transport	- The right to transport is defined as 'the right of people to transport.' It means the right of people to be ensured of adequate transportation modes to travel safely and move goods according to their will. - The right of all people to travel in a free and safe manner regardless of their economic, physical, regional, or social handicaps. - As a new concept of human rights, the right to transport includes the basic rights of people such as the freedom of residence/relocation, the freedom to choose occupation, the right to pursue human dignity/happiness, the right to equality, the right to maintain a decent living, and the environmental right that are stipulated in the constitution of the Republic of Korea.
Ensuring the right to transport	- The right to transport ensures the right of the people to travel, along with the right to food, clothing, and housing. - As a basic service for the daily lives of the people, transport service assists its users in diverse areas of their lives such as residence, education, employment, production activities, and leisure activities. - The government should actively support transport services not only for the mobility impaired people but also for the non-handicapped public, as a way to ensure social equity.

The preliminarily announced legislation of the Framework Act on Transportation (Proposal) defines the right to transport as 'the right of the people to receive universal transport services and to travel by using land/marine/air transportation modes and infrastructure in a convenient and safe manner' (Article 3-5 of the Act). The

1) Excerpted and reorganized part of the content from the 'Seminar on the Policy for Social Integration of Transport Sector' by Korea Transport Institute (October, 2010)

Act also describes the minimum transport service, which refers to 'the minimum required transport service for the people to lead a healthy and cultural life' (Article 3-13 of the Act). There are concepts similar to the minimum transport service, such as the minimum cost of living and the minimum housing standard. And they share similar objectives of enabling a healthy and cultural life', as well as 'a pleasant and convenient life.'

Table 3 Concepts Similar to the Minimum Transport Service

Similar concepts	Definition	Relevant laws & regulations
The minimum cost of living	- The minimum required cost for the people to lead a healthy and cultural life - The minimum cost of living for the next year is announced by every September 1st, after the review and approval at the Central Living Security Committee. And the living standard measurement survey is conducted every three years.	National Basic Living Security Act (Article 6)
The minimum housing standard	- The minimum required standard for the people to lead a pleasant and convenient life - The minimum residence area, the number of rooms by use, essential facilities (exclusive stand-up kitchen, exclusive flush toilet and bathing facility), the structure/facility/efficiency and environmental factors (safety and comfortableness) of housing	Article 5-2 of Housing Act Article 7 of the Enforcement Decree of Housing Act

Meanwhile, there were requests to amend part of the Framework Act on Transportation (Proposal) after the preliminary announcement of the legislation. And the State Council reached the resolution (Apr. 4th, 2011) of the Framework Act on Transportation (Proposal), after the second preliminary announcement of the legislation (Document no. 2011-140 posted by the Ministry of Land, Transportation, and Maritime Affairs on Feb. 23rd, 2011). As a result, part of the legislation regarding 'the minimum transport service' was amended.

Under the amendment, 'designation of areas for transport service improvement' and 'establishment/implementation of transport service improvement measures' were integrated into the 'establishment/implementation of transport service improvement measures', which includes 'location and scope of areas subject to transport service improvement measures' among the content regarding the establishment of transport

service improvement measures.[2] The content regarding areas for Type 1 and Type 2 transport service improvement was deleted from the existing content regarding the designation of areas for transport service improvement. The amended legislation also encourages each municipality to improve transport services for themselves, stating that the main authority in charge of establishing/implementing transport service improvement measures shall be only the heads of municipalities (capital city mayor, metropolitan city mayor, provincial governor, or county governor), instead of the Minister of the Ministry of Land, Transportation, and Maritime Affairs and the heads of local governments as stated in the legislation before amendment. The amended legislation stipulated the roles and responsibilities only at the municipality level, considering the financial burden on the central government in evaluating and implementing the minimum transport service.

Considering such changes in the legislation, this study narrowed the scope of national transport infrastructure to road infrastructure, to be aligned with the objectives of the amended legislation that took into account the financial burden on the central government. This study focused on road infrastructure to reflect the reality, where most of the transportation between regions is done through the road infrastructure[3] and where people continue to prefer vehicles as their personal transportation mode along with the increasing number of vehicle registrations.

In other words, this study aimed to evaluate the minimum transport standard from the perspective of accessibility to road infrastructure as the critical national transport infrastructure. Therefore, this study confined the evaluation items to road infrastructure, among the national transport infrastructure described in the ‘areas for Type 1 transport service improvement’ in the existing legislation (proposal).

2) Among the existing provisions, ‘designation of areas for transport service improvement’ and ‘request for designation of areas for transport service improvement’ were deleted.

3) Transportation share of roads as of 2009 was 74.8% for passenger transport and 79.3% for freight transport. Statistical Yearbook of the Ministry of Land, Transport, and Maritime Affairs (2010)

[Reference 1] Areas for Transport Service Improvement

Areas that urgently require transportation service improvement, due to the failure to meet the minimum transport service indicators and standard (Article 3014 of the Act)

< Definition of areas for transport service improvement >

Classification	Definition
Areas for Type 1 transport service improvement	Areas that fail to meet the indicators and standard for inter-regional minimum transport services related to the national transport infrastructure network. These areas shall be designated by the Minister of the Ministry of Land, Transport, and Maritime Affairs so that their transport services will be managed and supported at a national level.
Areas for Type 2 transport service improvement	Areas that fail to meet the indicators and standard for intra-regional minimum transport services within the region under the jurisdiction of the relevant municipality. These areas are designated by the head of the relevant municipality after the approval by the Minister of the Ministry of Land, Transport, and Maritime Affair. The transport services in these areas shall be managed and supported at municipal level so that they can improve the accessibility to the national transport infrastructure network or the accessibility/mobility of the feeder transportation network, etc.

[Reference 2] Analysis Items in the Study: Road Infrastructure

This study focused on the key items defined in the 'areas for Type 1 transport service improvement.'

- (National transport infrastructure network) Transportation network that is systematically structured to enable the national transport infrastructure to work in an organic manner and to operate the transportation modes that use such infrastructure, in a speedy/safe/convenient manner (Article 2-8 of Transport System Efficiency Promotion Act)
- (National transport infrastructure) Transport infrastructure that performs artery transport functions between regions (Article 2-7 of Transport System Efficiency Promotion Act)

< Types of national transport infrastructure and applicable laws & regulations >

Classification	Infrastructure	Facilities	Applicable laws & regulations
Land transport	Road	National expressway, national highway, detour road, regional road	Article 8-1, 8-2, (2) and(3) of Article 2-1 of Road Act
	Railway	High-speed railway, metropolitan railway, general railway	(4) of Article 2-2 of Railroad Construction Act
Marine transport	Port	Trade port	Article 2-2 of Port Act
Air transport	Airport	Airport	Article 2-7 of Aviation Act
Others		Integrated logistics terminal, national integrated transit center	Article 2-2 of Distribution Facilities Development and Operation Act (A) of Article 2-15 of Transport System Efficiency Promotion Act

2) Evaluation items

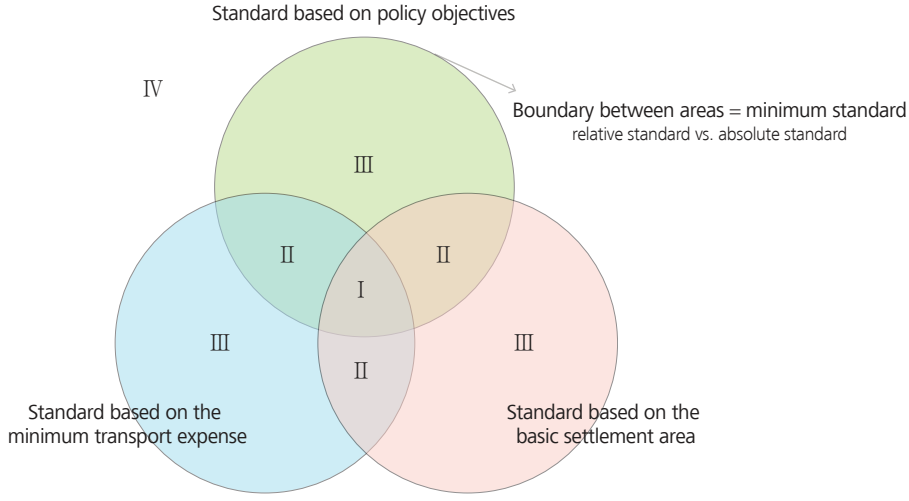
Mobility is a combination of speed and convenience, considering that mobility is the most important service among the transport services based on road infrastructure. Although safety is another important factor in the transport service, the level of safety in the transport service is usually influenced more by human factors than by infrastructure factors. Therefore, this study did not reflect safety in the transport services, due to the low availability of objective safety data.

In this regard, this study aimed to evaluate mobility as the core transport service, in terms of speed and convenience. In this study, speed was evaluated based on travel time, while convenience was evaluated based on the accessibility to road infrastructure and the accessibility to other basic living facilities through road infrastructure. In addition, three conceptual directions were established to discuss the standard for 'minimum' road transport service. This study defined the evaluation items, in consideration of the three directions such as the standard based on policy objectives, the standard based on the minimum transport expense, and the standard based on the basic settlement area.

Table 4 Conceptual Directions for the Minimum Transport Service

Classification	Definition	Applicable items	Perspectives
Standard based on policy objectives	The minimum standard based on the policy objectives of transport service	Inter-regional transport (road)	Supplier (the central government)
Standard based on the minimum transport expense	The minimum standard based on the payment capacity of transport service users	Inter-region (intercity bus) + Intra-region (bus, taxi)	User (cost)
Standard based on the basic settlement area	The minimum standard based on the basic settlement area that is defined as the minimum regional unit by the current government	Intra-region (road accessibility), considering part of the public transport	Supplier+user

Figure 2 Concept of the Minimum Transport Service Standard



- Area Ⅰ : Below the minimum level of all the three standards
- Area Ⅱ : Below the minimum level of two standards among the three standards
- Area Ⅲ : Below the minimum level of only one standard among the three standards
- Area Ⅳ : Above the minimum level of all the three standards
- Area Ⅰ ~ Ⅲ : It is important to set the correct boundary between areas.
  · Relative standard (eg.: bottom 10%) vs. absolute standard (eg.: getting to the IC within 30 minutes)
- Level of transport service: Ⅰ < Ⅱ < Ⅲ < Ⅳ (poor → good) and Area Ⅲ is the boundary.

Firstly, policy objectives of each transport service refer to the ultimate objectives of the government's service for the people. This is a kind of promise the government makes to its citizens. In other words, policy objectives are the minimum standard from the supplier's perspectives to ensure trust in their policies. Therefore, this study aimed to identify the achievement level of road policy objectives, such as "enabling a round trip between any regions nationwide within half a day and ensuring the accessibility to expressway within 30 minutes", focusing on the road infrastructure as a representative transport infrastructure between regions. To this end, this study evaluated whether the road accessibility service is being offered evenly across the country. In other words, the study evaluated whether the people are experiencing equal transport services wherever they live across the country.

Secondly, transport service incurs costs for users who have different level of payment capacity depending on their income level. In order to discuss the minimum transport service standard from the perspective of the service users' payment capacity, this study used the concept of the minimum transport expense, which is used for measurement of the minimum cost of living. In this regard, this study evaluated the availability of road transport services at the minimum transport expense to identify the level of the minimum transport service available at the minimum transport expense. This evaluation is aimed at assessing the level of road service experience regardless of the transport service users' financial capacity based on their income level.

Thirdly, it is necessary to identify the level of transport service from the perspective of road transport accessibility in the basic settlement area located in agricultural, mountain and fishing villages that are highly likely to have lower supply of transport services. This is based on the view that the minimum transport service standard refers to the offering of minimum required transport service. In other words, this study aimed to evaluate the level of road accessibility service that enables the residents in agricultural, mountain and fishing villages to reach and use the basic living service facilities (public facilities) to maintain the minimum quality of "healthy and cultural life." To this end, this study referred to the "Service Standards for Farming and Fishing Villages (31 items in 8 categories)" described in the Secondary Five-Year Plan for Elevation of Life Quality of Farmers, Forestry Workers and Fishermen and the Promotion of Development of Agricultural, Mountain and Fishery Areas (2010-2014) as of 2009, which is based on the 「Special Act on the Elevation of Life Quality

of Farmers, Forestry Workers and Fishermen and the Promotion of Development of Agricultural, Mountain and Fishery Areas」. Based on the above information, this study evaluated how much contribution is being made by the road transport service at the minimum level. In other words, this study assessed whether the residents are being provided with the minimum required road transport service to lead a healthy and cultural life.

In summary, this study evaluated and focused on 'the minimum road transport service required to help people lead a healthy and cultural life, regardless of their regions and financial capacity.'

Table 5 Evaluation Items of the Minimum Road Transport Service Standard

Evaluation items	Road infrastructure		Remarks
Core service	Mobility (accessibility)	Speed (travel time)	Safety is excluded from the evaluation in this study due to the low availability of relevant data.
		Convenience (accessibility to transport opportunity)	
Optional service	Comfortableness, information, etc.		
Minimum service	- Equal opportunity to access road transport service across the country - Equal access to regions at the minimum transport expense, for all people across the country - Quick and convenient access to basic living facilities through road infrastructure		- Consideration of regions - Consideration of financial capacity (income) - Minimum use of basic living facilities

3. Review of Domestic and Overseas Case Examples

1) Examples related to Transportation Framework Act[4)]

(1) Domestic case examples

Domestic case examples of Framework Acts on non-transportation areas include the followings; Framework Act on National Land, Framework Act on Education, Framework Act on Social Security, Framework Act on Environmental Policy, Framework Act on Architecture, Framework Act on Science and Technology, Framework Act on Agriculture and Fisheries, Rural Community, and Food Industry, Framework Act on Health and Medical Services, Framework Act on Forestry, Framework Act on Energy, Framework Act on Women's Development, Framework Act on the Management of Disasters and Safety, Framework Act on Low Birth Rate in an Aging Society, Framework Act on Juveniles, Framework Act on Marines Fishery Development, Framework Act on Healthy Families, Framework Act on Construction Business, Framework Act on Veterans Affairs, Framework Act on National Informatization. After reviewing these basic laws, Mo Chang-hwan (2010) presented policy implications from the perspectives of each basic law's objectives, principles, and structure. Based on such review and policy implications, he prepared the basic structure (proposal) for the Framework Act on Transportation.

4) Plan for Enactment of Framework Act on Transportation, Mo Chang-hwan, Korea Transport Institute, December, 2010

Table 6 Objectives of Domestic Framework Acts for Non-Transportation Areas

Framework Acts	Objectives
Framework Act on National Land	It aims to contribute to sound development of national land and enhancement of welfare for the people, by stipulating the basic matters regarding the establishment and implementation of plans and policies for national land.
Framework Act on Education	It aims to define the rights/duties of the people as well as the responsibilities of the government/municipalities regarding education. To this end, the government defines the basic matters regarding education system and its operation.
Framework on Social Security	It aims to contribute to the enhancement of welfare for the people, by defining the rights of people and the responsibilities of the government and municipalities regarding social security and by stipulating the basic matters related to social security system.
Framework Act on Environmental Policy	It aims to enable the people to lead a healthy and pleasant life, by preventing environmental damage and managing/preserving the environment in an adequate and sustainable manner. To this end, the government clarifies the rights/duties of the people and the responsibilities of the government regarding environment conservation, and defines the basic matters about environmental policy.
Framework Act on Architecture	It aims to promote and contribute to healthier life of and better welfare for the people, by promoting the architecture culture. To this end, the government defines the responsibilities of the government, municipalities and the people regarding architecture, and stipulates basic matters about the establishment/implementation of architecture policy.
Framework Act on Energy	It aims to contribute to sustainable development of the economy and improvement of welfare for the people, by defining the basic matters regarding the establishment/implementation of energy policy and plans to achieve stable, efficient, and environment-friendly energy supply/demand structure.
Framework Act on Women's Development	It aims to promote gender equality and development of women in all areas including politics, economy, society, and culture, by stipulating the basic matters regarding the responsibilities of the government and municipalities to realize the concept of gender equality defined in the 「Constitution of the Republic of Korea」.
Framework Act on Health and Medical Services	It aims to contribute to the growth of health and medical services and the improvement of health and welfare for the people, by defining the rights/duties of the people and responsibilities of the government and municipalities regarding health and medical services and by stipulating the basic matters about the demand and supply of health and medical services.
Framework Act on Forestry	It aims to contribute to the improvement of the people's quality of life and sound development of the economy, by promoting the growth of forestry industry. To this end, the government defines the basic matters regarding forestry policy.

Table 7 Principles of Domestic Framework Acts for Non-Transportation Areas

Framework Acts	Principles
Framework Act on National Land	National land provides all people with their livelihood and at the same time serves as the nation's common property to be handed over to the future generations. Therefore, the plans and policies regarding national land shall be established/implemented in a way to promote sustainable development of national land by ensuring the followings; balanced development of the national land, enhancement of national competitiveness, and improvement of the people's quality of life, based on the balance between development and environment.
Framework Act on Education	The principle objective of education is to let the people lead a life with human dignity, promote and realize the growth of democratic country and the co-prosperity of humanity. To this end, education shall enable all the people to build up their character under the philosophy of Hongik Ingan (ancient Korea's philosophy promoting the benefit of humanity) and obtain the qualification as democratic citizens as well as the independent living ability.
Framework on Social Security	Basic principles of social security are to ensure the minimum quality of life for all the people to live with human dignity, and to create a system and environment where individual person can raise their living standards. Under the basic principles, the social security policy shall be implemented to realize welfare society through the balance between equality and efficiency.
Framework Act on Environmental Policy	Basic principles of the Framework Act on Environmental Policy are as below. In order to enable the people to lead a healthy and cultural life and to ensure conservation of national land as well as the everlasting prosperity of the country, it is essential to create pleasant environment and maintain the harmony and balance between human and environment by improving and preserving the quality of environment. In this regard, the government, municipalities, businesses and the general public shall make efforts to maintain and conserve good-quality environment, and put priority on the environmental conservation in carrying out any type of activities that utilize the environment. In this way, they shall exert common efforts to prevent the Earth's environment from being damaged and shall enable the people to enjoy the benefit from such environmental protection. These environmental conservation efforts shall be inherited to the future generations.
Framework Act on Architecture	The basic principle of this Act is to achieve the following public values of architecture, through joint efforts among the government, municipalities, and the people. 1. Create a living space that is directly related to the safety/health/welfare of the people 2. Prepare a spatial environment that adjusts and accepts diverse requirements from the society and that serves as the foundation for economic activities 3. Create and prepare a cultural space that reflects unique lifestyle and history of relevant regions and that will be inherited to the future generations
Framework Act on Women's Development	The basic principle of this Act is to encourage creation of sound and healthy families, by promoting gender equality based on the respect for individual dignity, protecting maternity, resolving sexual discrimination issues, and developing the capabilities of women. The basic principle also includes enabling men and women to share responsibilities by jointly participating in the growth of the country and the society.
Framework Act on Health and Medical Services	The basic principle of this Act is to improve the people's quality of life. To this end, this Act shall enable all the people to pursue their happiness with human dignity and value and create systems and environment to let individual person lead a healthy life through health and medical services, and shall achieve balance between equality and efficiency in the health and medical services.

(2) Overseas case examples

The French government declared their 'Framework Act on Transportation (Loi d'orientation des transports interieurs, hereinafter referred to as LOTI)' in December 30th, 1982. LOTI has served as a role model to fundamentally innovate the French transport policy and to achieve comprehensive development of their domestic transportation. The origin of LOTI is known to be the Framework Act on the Handicapped, which was enacted in 1975. This act proposed diverse ways to improve the accessibility of the handicapped to transportation modes, education facilities, and employment facilities in order to ensure that handicapped people receive the same opportunities as the non-handicapped public to participate in the society and the economy. Meanwhile, LOTI introduced a new concept of human rights called 'the right to transport (droit au transport)' in the Article 1-2 of the Act, and stipulated that the objective of their transport policy is to gradually realize the right to transport. In other words, they described the duties of French transport system in the introductory chapter of the Act, and stated that the needs of transport service users will be satisfied through gradual realization of their right to transport. The right to transport in LOTI is divided into four types; the right of all users to mobility, the freedom of choosing transportation modes, the right of users to decide whether to transport goods for themselves or to delegate it to transportation agencies or companies, and the right of users to receive information about transportation modes as well as about how to use them.

In Japan, the 'Japanese Academic Association on the Right to Transport', which was established in July of 1986, tried to spread and specify the concept of the right to transport for the first time across the country. This Association published a book titled "The Charter of the Right to Transport" in 1999, which presented 11 provisions for the Japanese Charter of the Right to Transport. Those provisions mainly focused on rejecting investment in red modes, while promoting creation of human-centered cities through development of public transport and expansion of investment in the initiatives for mobility impaired people and pedestrian facilities. Ensuring the right to mobility lies at the core of the Framework Act on Transportation. This is not confined to a specific class or group of citizens but is defined as an essential right for all people to "lead the minimum healthy and cultural life." Japanese Cabinet members tried to present this idea as a legislation twice in 2002 and 2007, respectively. However, the

Japanese Ministry of Land, Infrastructure, Transport, and Tourism is still reviewing this idea and has not yet approved the legislation, due to the concerns that ensuring the right to transport might incur an excessive amount of budget and that the Japanese people might increasingly file lawsuits related to their right to transport against the government.

The US has systematically organized transport-related laws in its Federal Law with the 49th title. It is noteworthy that the transport-related law states that the Department of Transportation exists to "supply speedy, safe, efficient and convenient transport services at a low price to achieve the national objectives including the welfare for the people, economic growth and stability as well as the national security (hereinafter omitted)." It is also interesting that the US has established special laws to lead transport policies in response to the requirements of the times. These special laws are regarded as the actual Framework Act on Transportation of the US, as they stipulate the principles of transport policies that should be respected by the federal government, state governments, and municipalities with financial support for implementation of such transportation plans. As the most recently enacted law, SAFETEA-LU, which was established in 2005, presents important principles such as safety, environmental protection, and responsibilities.

With a similar structure to the transport policy of the US, EU declared that the objective of EU is to promote a vibrant and cohesive market among the member countries. In order to achieve this objective, EU adopted 'speedy, efficient and low-priced transportation of people and freight' as the goal of its transport policy. The Transportation Act of the UK stipulates the roles of the UK Department for Transport and other transport agencies in detail. It is important, in particular, that their Transportation Act made it compulsory for municipal transport agencies to establish their transportation plans. The UK's Transportation Act also states that the transport agencies must include measures for mobility impaired citizens such as the handicapped and the elderly in their transportation plans. The German Transportation Act exists in the form of transport-related provisions in the Framework Act. This is related to the fact that the central government privatized the federal railways and localized short-distance passenger transportation on the railways near large cities. The objective of transport-related provisons in the Framework Act is to secure federal financial support for the deficit generated in the government's operation of local railways.

(3) Implications

The review of domestic framework act examples in non-transportation areas and overseas examples of framework act on transportation shows that each country has been very active in establishing framework acts with descriptions about basic objectives and principles. France and Japan, in particular, have legislated the basic value of the right to transport (the right to mobility) for their people. However, they have not presented any specific minimum standards and indicators for the transport service, but just mentioned declarative basic values and concept.

2) Case examples for the transport service standards & indicators

(1) Traffic safety index[5)]

Traffic safety index is used for comparing and evaluating the ratio of traffic accidents based on the transport infrastructure at a local level. The objective of comparing, evaluating, and presenting the traffic safety level of each municipality is to promote establishment and implementation of efficient transport safety policy that is customized to the unique environment of each region. Going further, this will facilitate competition among municipalities in their transport safety projects and consequently improve their traffic safety level. As a critical indicator for the evaluation of each municipality's traffic safety projects, the traffic safety index has also served as an important supporting data for the establishment and implementation of traffic safety projects. The traffic safety index is measured targeting a total of 230 regions composed of 69 districts, 75 cities, and 86 counties from the municipalities of Seoul Metropolitan City, local metropolitan cities and provinces. Major evaluation items of traffic safety index include the number of population, the number of registered vehicles, the death toll compared to the distance of road extension, and the number of accidents in each municipality. After identifying these 8 basic variables, three factors are calculated

5) Korea Road Traffic Authority, A Study on the Estimation Method Improvement of Traffic Safety Index, December, 2009

including accident factor, sacrifice factor, and road environment factor. Then, the sum of the figures reflecting the weighted values based on each factor's contribution is converted to percentiles, which then become the traffic safety index.

Table 8 Major Evaluation Items of Traffic Safety Index

Classification	Variables	Definition
Accident factor	Vehicles in accidents	The number of accidents per 10,000 vehicles
	People in accidents	The number of accidents per 100,000 population
Sacrifice factor	Death per vehicle	The number of death per 10,000 vehicles
	Death per person	The number of death per 100,000 population
	Seriousness of accidents	The number of death/the number of casualties
	Ratio of pedestrian death	The number of pedestrian death/the number of death
Road environment factor	Death per road	The number of death per road extension of 1km
	Accident per road	The number of accident per road extension of 1km

(2) Transportation welfare indicator

Transportation welfare indicator evaluates how convenient the transport environment is for mobility impaired people such as the handicapped and the elderly. Transportation welfare refers to the status of transport service aimed at helping mobility impaired people including the handicapped, the elderly and children live their daily lives in a safe and convenient manner. Meanwhile, mobility impaired people refer to those who feel inconvenient with moving from one place to another in their daily lives, such as the handicapped, the elderly, pregnant women, persons accompanying infants, and children. Based on Article 16 of the 「Mobility Enhancement for the Mobility Impaired Act」, the Ministry of Land, Transportation, and Maritime Affairs makes an annual evaluation and presentation of the transportation welfare level of each municipality to encourage local municipalities to pay more attention to and competitively improve their transport facilities for the mobility impaired people. The transportation welfare index is being measured across 7 metropolitan cities and 9 provinces. Representative indicators for measuring the transportation welfare level include mobility conveniences in transportation modes and passenger facilities, pedestrian environment, low floor bus, special transportation modes, relevance to mobility,

accidents of mobility impaired people, promotion & training, transport administration, and information accessibility. Among these indicators, 9 indicators were chosen for evaluation, based on 6 large classification items.

Table 9 Major Evaluation Items of Transportation Welfare Indicator

Classification	Transportation welfare indicator	Analysis
Mobility conveniences	Rate of passenger facilities' compliance with the standard for mobility conveniences	Installation rate of mobility conveniences in passenger facilities, which reflects the weighted value by region
	Rate of transportation modes' compliance with the standard for mobility conveniences	Installation rate of mobility conveniences in transportation modes, which reflects the weighted value by region
Pedestrian environment	Rate of compliance with the standard for pedestrian facilities	Installation rate of pedestrian facilities on the road near passenger facilities
	Accident rate of pedestrians	The number of accidents of pedestrians
Low floor bus	Supply ratio of low floor bus	Supply ratio of low floor bus to general bus
Special transportation modes	Supply ratio of special transportation modes	Supply ratio of special transportation modes to the number of the handicapped
	Usage rate of special transportation modes	Records on the use of special transportation modes
Accidents of mobility impaired people	Accidents of the elderly and children	Headcount of children and the elderly in accidents
Transportation welfare administration	Transportation welfare administration indicators	- Ordinance related to the right to mobility and the right to accessibility - Frequency of holding committee meetings - Education to improve perception on handicapped people - Records on the establishment of pedestrian priority zone

(3) Transport culture index

Based on Article 57 of Traffic Safety Act, the government objectively measures the transport culture index encompassing the driving behavior, traffic safety,

and pedestrian behavior of each municipality in order to understand the level of Korean transport culture and to compare/evaluate the transport culture level among municipalities. In the transport culture survey, the characteristics of each city's transport culture are analyzed and such analysis data is used for early establishing an advanced transport culture. Through public announcement of the survey result of each municipality's transport culture index, the government can promote competition among municipalities. The transport culture index is also used as a basic data to prepare rational alternatives to the transport safety policy. The transport culture index is measured across 230 municipalities[6] in 7 metropolitan cities and 9 provinces, according to the administrative classification of the Ministry of Public Administration and Security. Survey is conducted based on 13 major evaluation items across 5 areas, in the form of both field survey and statistical survey.

Table 10 Major Survey Items of Transport Culture Index

Classification	Survey items	Remarks
Driving behavior area	- Rate of compliance with the stop line in front of the crosswalk - Rate of wearing seatbelt - Rate of wearing safety helmet among the users of two-wheeled vehicles	Field survey
Traffic safety area	- Traffic accident death toll per 10,000 vehicles - Traffic accident death toll per 100,000 population - The number of seriously injured people in traffic accidents per 100,000 population - Traffic accident death toll of pedestrians per 100,000 population	Statistical data from the National Police Agency and from relevant cities
Pedestrian behavior area	- Rate of jaywalking - Rate of compliance with the traffic signal on the crosswalk	Field survey
Children safety area	- Safety of routes between school and home	Questionnaire survey
Other areas	- General transport administration and policies - Rate of wearing seatbelt on the expressway - Transport safety projects that the municipalities are proud of	Field survey & literature search

6) There were a total of 232 municipalities before 2010. In July of 2010, however, Changwon City, Masan City and Jinhae City were integrated to Changwon City, which means that the total number of municipalities nationwide became 230.

(4) Survey on the current public transport conditions

Survey on the current public transport conditions is conducted to facilitate the use of public transport as per Article 16 of the 「Act on Support and Promotion of Utilization of Mass Transit System」 and Article 4 of the Enforcement Decree of the said Act. The survey result will be used as a basic data source for the establishment of local municipalities' public transport plan. Put specifically, such survey result can be used as basic data for the establishment of local municipalities' comprehensive plan to improve/increase public transportation modes and relevant facilities, which will help the municipalities secure competitiveness in their public transport services. This survey is conducted on an annual basis across the capital metropolitan city, local metropolitan cities, cities/counties (excluding the counties of metropolitan cities) (throughout 149 transport zones including 68 cities/counties, 7 capital metropolitan city/local metropolitan cities, 40 cities and 21 counties) that should establish their own public transport plans. Major survey items are shown in the table below, and the survey methods include documentary survey, survey on the current status, and questionnaire survey (interview and visit). Rational survey method is selected for the survey depending on the content and objectives of the survey.

Table 11 Major Survey Items for the Survey on the Current Public Transport Conditions

Survey areas	Survey indicators	Survey items
1. Social/economic indicator related to public transport	Social/economic indicator	A. Current status of transport demand management
2. Current managerial conditions of public transport operators	Public transport operation indicator	A. Current status of public transport operators B. Route mileage per transportation mode C. Operation status by year/transport type
	Financial indicator	A. Current fare B. Current earnings & expenses
3. Current status of public transportation modes and public transport facilities	Supply indicator (facility)	A. Current guarantee of public transport priority lane B. Current transfer facilities C. The current number of vehicles under ownership D. Current garage E. Current status of major facilities F. Current mobility conveniences for the mobility impaired people
4. Current use of public transport	Transportation record indicator	A. Transportation share rate B. Transportation personnel, frequency of operation
	Mobility indicator	A. Current use of public transport B. Boarding/alighting passengers by station C. Current transfer among public transportation modes
5. Current operation of public transport	Supply indicator (operation)	A. Speed/hours of operation of public transportation modes B. Current traffic volume by vehicle type C. Current transfer among public transportation modes
6. Other information needed for public transport improvement	Transportation welfare indicator	A. Current status of in-vehicle air quality density B. Current status of in-vehicle energy management C. The number of death/injuries in traffic accidents D. Satisfaction of users

(5) Implications

The review of diverse transport-related indexes shows that the survey scope is divided to the local municipalities and to the 16 cities and provinces. Objective data survey and analysis are conducted for each municipality, and are used for comparison and evaluation of transport services. Although detailed evaluation items and basic statistical data based on such indexes and indicators are being analyzed in diverse forms, they are not sufficient to be directly used as the data for comprehensive analysis of transport services.

Table 12 Applicable Laws of Transport Indexes & Survey Scope

Classification	Applicable laws	Survey scope
Traffic safety index	-	230 municipalities
Transportation welfare indicator	Article 6 of the Act on Promotion of Transportation Convenience of the Mobility Disadvantaged	16 cities and provinces
Transport culture index	Article 57 of Traffic Safety Act	230 municipalities
Survey on the current public transport conditions	Article 16 of the Act on Support and Promotion of Utilization of Mass Transit System	149 traffic zone

(6) Other examples related to minimum transport service standard

As seen in the domestic and overseas policy examples, there are standards for public transport and relevant facilities in terms of accessibility, convenience, and safety, such as availability of public transport centered around bus transport (frequency of operation, allocation interval, etc.), transport services in remote areas including island areas, and sidewalk separate from the roadway.

Table 13 Establishment of Minimum Transport Service Standard and Applicable Laws

Classification	Content	Applicable laws
Electricity supply	- Island areas where 10 or more households demand electricity, and remote areas where 5 or more households demand electricity	Act on Promotion of Electrification in Agricultural and Fishing Villages
Health & medical service (installation of health service center)	- Areas with population from 500 or more (300 or more for island and remote areas) to less than 5,000	Act on the Special Measures for Public Health and Medical Services in Agricultural and Fishing Villages, etc.
Service standard for agricultural and fishing villages	- Operation of public transport: Public transport including buses on a regular route and circulation buses shall be available no less than three times per day, at the bus stations located within 15 minutes by walk from the households. Quasi-public transport programs shall be adopted to respond to the demand from the areas where it is difficult to operate public transport due to the lack of demand. - Operation of passenger ship: Shuttle passenger ship shall be operated in island areas no less than once per day for all the mainlands. Residents in the island areas shall receive support for part of the passenger ship fare. - Installation of sidewalk: Sidewalk shall be installed separate from the roadway in the repair/ maintenance of community road for agricultural and fishing villages to access Eup/Myun locations.	Special Act on the Quality of Life for Farmers and Fishers
Transport service standard in the UK's service standard for agricultural area (2006)	- The proportion of population that lives within 10 minutes by walk from the bus service, which is operated at the interval of no more than 1 hour, shall be increased from 37% to 50% by 2010.	
German community service standard	- Stations (running three round trips per day) (the minimum standard applied up to small-scale community; public transport standard of Bayern State)	
Richmond in the US	- The minimum transport service standard states that bus shall be operated once per hour in the area where there are 4~6 households per acre, and once per 30 minutes in the area where there are 7~8 households per acre.	
Urban Development Department of India	- Service Level Benchmarks for Urban Transport - MoUD, Government of India - Service level of public transport facility, pedestrian infrastructure, non-motorized transport facility, intelligent transportation system (ITS), etc.	

Note) The table above is based on the recomposition of transport-related standards taken from each service standard.

3) Review and implications

The review on domestic case examples of non-transportation areas and overseas examples of framework act on transportation shows that countries are very active in establishing framework acts with descriptions about basic objectives and principles. France and Japan, in particular, have legislated the basic value of the right to transport (the right to mobility) for their people. However, they have not presented any specific minimum standards and indicators for the transport service, but just mentioned declarative basic values and concept. In this regard, standards and indicators should be developed to evaluate the minimum standards for such basic values and concepts, which should also be accompanied with relevant study and review.

Meanwhile, the review on diverse transport-related indexes shows that the survey scope is divided to municipalities and to the local authorities including the 16 cities/provinces, depending on the survey objectives and content. Objective data survey and analysis are conducted for each municipality, and are used for comparison and evaluation of transport services. Although detailed evaluation items and basic statistical data based on such indexes and indicators are being analyzed in diverse forms, they are not sufficient to be directly used as the data for comprehensive analysis of transport services. Those indexes and indicators are being used as the data for comparison/evaluation of transport services, through objective data survey and analysis. However, there has been less progress in developing road welfare indicators, which refer to the road transport indicators based on a welfare approach.

The review on the overseas case examples of minimum transport service standard shows that the overseas countries set standards for the service level of public transport, in particular the bus transport, such as the bus operating frequency and allocation interval.

Therefore, this study aims to establish the minimum standard for road transport service based on qualitative perspectives, instead of the existing quantitative standards such as road extension and pavement ratio, as the road transport sector is closely related to the daily lives of the people.

Chapter 02

Main Contents

KRIHS
SPECIAL REPORT 2013

Main Contents

1. Evaluation Items & Methods for the Minimum Transport Service Standard

1) Establishment of framework for the minimum transport service standard

For the establishment of the minimum transport service standard, the first task is to set the ultimate objective of establishing such minimum transport service standard. Therefore, this study set the objective of the minimum transport service in the national road transport infrastructure, as below.

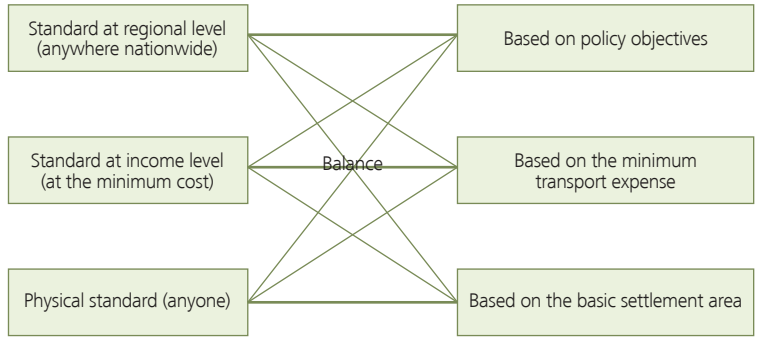
<Operational definition of the objective of the minimum transport service in the national road transport infrastructure>
Provide anyone with transport services anywhere nationwide in a balanced manner, so that all people can travel at the minimum cost within the shortest time through the road infrastructure in order to move between regions or to lead a healthy and cultural daily life

In setting the minimum transport service standard under the objective defined above, this study involves a premise that vertical equity must be achieved to fulfill the minimum transport service. Under this premise, this study established objectives at each of the regional/physical/income levels, and set evaluation indicators for concretely measuring the achievement of such objectives.

Table 14 Elements of the Framework for the Minimum Transport Service Standard

Classification	Content	Objective
Standard at regional level	In order to spread the right to transport across the country, the supply of road transport services must expand throughout the areas that are isolated from the transport services such as remote areas.	Anywhere nationwide
Standard at income level	In order to secure the right to transport, adequate and rational amount of transport cost must be ensured.	At the minimum cost
Standard at physical level	In order to secure the right to transport, proper transport services must be provided to anyone who uses the road infrastructure to move between regions or to lead a healthy and cultural daily life.[7]	Anyone

Figure 3 Framework of the Minimum Transport Service Standard



7) As this study focuses on road infrastructure, the transport service users are confined to the road infrastructure users. In fact, more accurate definition of people subject to the minimum transport service based on physical standard shall be the mobility impaired people including the handicapped, the elderly, and the pregnant. However, the transportation welfare indicator stipulated in the 'Act on Promotion of the Transportation Convenience of the Mobility Disadvantaged' serves as the transport service evaluation indicator for these mobility impaired people. Therefore, this study defined the users subject to the minimum standard at physical level, as in the table above.

2) Evaluation items & methods

The meaning of the minimum service was defined for each of the minimum transport service standard in order to develop specific evaluation items. Defining the meaning of the minimum service for each standard helps clarify the meaning of each minimum service standard and present the service objectives for each evaluation item, which will enable concrete evaluation. The minimum transport service objectives for each standard are presented as below.

Table 15 Minimum Transport Service Objectives by Evaluation Standard

Classification	Content
Standard based on policy objectives	All people shall receive proper and equal transport services that meet the target level presented by policy objectives through the road infrastructure between regions.
Standard based on the minimum transport expense	All people shall receive proper road infrastructure service between regions, when they travel at the lowest transport expense.
Standard based on the basic settlement area	All people shall receive proper accessibility to the road infrastructure, when they use the basic living facilities to lead a healthy and cultural daily life.

Evaluation items for concrete evaluation of service objectives of each minimum transport service standard are as follows, Various evaluation items were set according to the characteristics of each standard to evaluate the road transport service from diverse perspectives. The evaluation items include the size of service area, average travel time, the number of nodal points, and the time taken to access the basic living facilities.

Table 16 Evaluation Items by Minimum Transport Service Standard

Classification	Content
Standard based on policy objectives	- Size of the Service Area (SA) of expressway IC in each city/county/district - Whether the average travel time between regions (travel time reflecting traffic jam, travel time without reflecting traffic jam) in each city/county/district meets the standard to enable a round trip between any regions of the country within a half a day - Whether expressway ICs and national nodal points are included in each city/county/district
Standard based on the minimum transport expense	- Service Area (SA) where people can travel at the minimum travel expense - Whether the Service Area (SA) where people can travel at the minimum travel expense is overlapped with the area where people can reach the expressway IC within 30 minutes
Standard based on the basic settlement area	- Evaluation of whether people can access the basic living facilities for health/medical services, emergency service and cultural leisure activities, which are defined in the service standards for agricultural and fishing villages within the standard access time

For quantification of these evaluation items, GIS methodology was used as the evaluation method for each minimum transport service standard.

Table 17 Evaluation Method by Minimum Transport Service Standard

Classification	Content
Standard based on policy objectives	- Size of the area where people can reach the expressway IC within 30 minutes (Service area of Network Analyst in the GIS analysis methodology) - Analysis of travel time between regions, through the transport demand analysis (travel time reflecting traffic jam, travel time without reflecting traffic jam) - Analysis of the number of expressway IC and national nodal point (no less than 1)
Standard based on the minimum transport expense	- Service area where people can travel at the minimum travel expense, in each city/county/district (Service area of network analyst in the GIS analysis methodology) - Ratio of overlapping area between the service area (SA) where people can travel at the minimum travel expense and the service area (SA) of the expressway IC in each city/county/district (calculation based on the topological relationships in GIS)
Standard based on the basic settlement area	- Calculation of time taken to access the service facilities defined by the service standards for agricultural and fishing villages, and assessment of whether the access time meets the standard (Enter the coordinate information of the service facilities by using the geo-coding tool, and calculate the access time by using the OD Cost matrix of Network Analyst in GIS analysis methodology)

2. Current Status Assessment based on the Minimum Transport Service Standard

1) Evaluation according to the minimum standard based on policy objectives

(1) Basic assumption

The minimum access time to the expressway IC was set to be 30 minutes, as presented by the policy objectives. The minimum standard time to meet the policy objective (enabling a round trip between any regions of the country within half a day) was set to be 262.5 minutes. These figures are based on the following grounds; Out of the 24 hours (a day) that are equally given to anyone, half a day literally means 12 hours. And finishing one-way travel requires 6 hours (based on one-way trip, under the assumption that it takes the same amount of time from departure to arrival and from arrival to departure), if such one-way travel is purely for the purpose of travel itself. However, people hardly travel only for the purpose of travel itself. In reality, people travel to reach a certain location, achieve their own business purpose, and then come back. This needs to be reflected in the general travel time for people to finish a round trip between any regions of the country within half a day. Meanwhile, the Time Use Survey of the Statistics Office indicates that the average working hours of the people nationwide is 3 hours and 15 minutes (195 minutes) as of 2009. In this regard, this study assumed that the minimum standard time for enabling a round trip between any regions of the country within half a day is 262.5 minutes (for one-way trip)[8], which is the time required to purely finish one-way travel, excluding the time for doing certain activities to achieve specific purpose during travel. Meanwhile, the evaluation of supply level of the existing road transport service was previously based on the physical supply-related standards such as road ratio (road extension, the number of lanes, etc.), which are insufficient to explain the basic desire of people to travel any

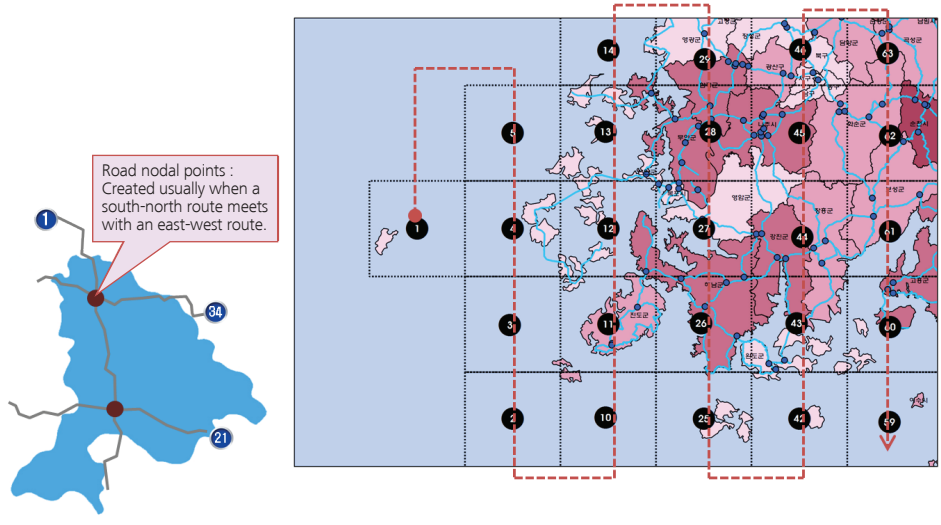
8) Half a day (12 hours×60 minutes=720 minutes) excluding the working hours was divided by 50% into the travel time from departure to arrival and the travel time from arrival to departure.

part of the country. In this regard, this study aimed to evaluate how many expressway ICs and nodal points between national roads are generated in each region, following the concept of a network of roads running in all directions implying the importance of convenience and connectivity in use of road service. The minimum standard number of expressway IC or nodal point for this evaluation is no less than 1 for each city/county/district.

Table 18 The Minimum Standard Time for Enabling a Round Trip between Any Regions of the Country within Half a Day

1 day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Half a day	Half a day (12 hours)												Half a day (12 hours)											
Finishing one-way trip	Departure (6 hours)						Arrival (6 hours)																	
Considering the activities for business purpose	Departure (262.5 minutes)					Business (195 minutes)			Arrival (262.5 minutes)															

Figure 4 Nodal Points on the Arterial Road Network



(2) Data establishment and evaluation method

This study generated data by manually inputting points on the spatial location, based on the expressway IC information that is provided by Korea Expressway Corporation. This study also renewed the data for GIS network and EMME3 network by adding the data of the expressways established after 2008 to the information of the expressway network before 2008 that has been provided by the national transport DB. As an analysis method, this study used the Service area Analyst tool of GIS Network Analyst to analyze the areas that can access expressway service within 30 minutes as defined by the policy objectives, focusing on the expressway IC.

(3) Evaluation result

As a result of evaluating the ratio of service area that can access the expressway IC within 30 minutes to the size of the relevant administrative area, all metropolitan cities (excluding Incheon) had good accessibility to expressway ICs, presenting the ratio of 88% or higher. In the case of provinces that are, in other words, metropolitan municipalities, Gangwon Province showed the lowest ratio of 32% followed by Jeonnam and Gyeongbuk Regions. The main reason would be the low supply of expressway service, due to their geographical circumstances where most of the large administrative districts are mountain areas. The service area ratio for each city/county/district is as follows.

Most of the municipalities in metropolitan areas and 6 metropolitan cities achieved the service area ratio of 100%, whereas many of the other provinces failed to meet the standard. Gangwon Province, in particular, had no area that achieved the service area ratio of 100%. Most of the cities and counties with the service area ratio of less than 10% (Yanggu, Inje, Jeongseon, Hwacheon, Shinan, Haenam, Yeongdeok, Chungsong, etc.) were located at the very end of the national territory or in heavily mountainous areas.

The analysis based on the digital elevation model (DEM) showing geographical features of the country also indicates that most of the areas that cannot access expressway ICs within 30 minutes are mountain areas. This is because no expressway IC was constructed in the mountainous areas, or because the mountain areas were not properly provided with roads such as national roads to access the IC.

Figure 5 Ratio of Expressway IC Service Area by Region

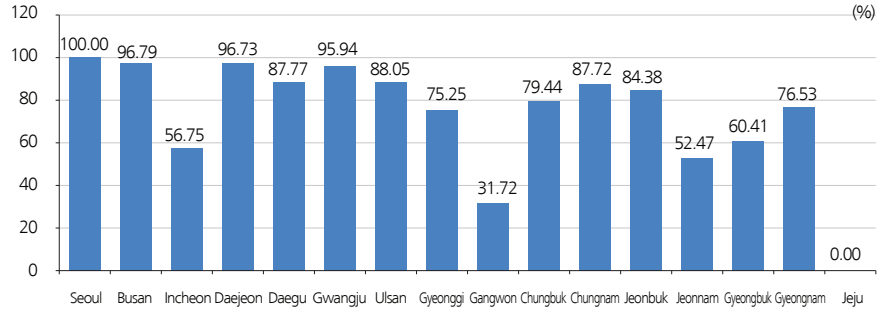
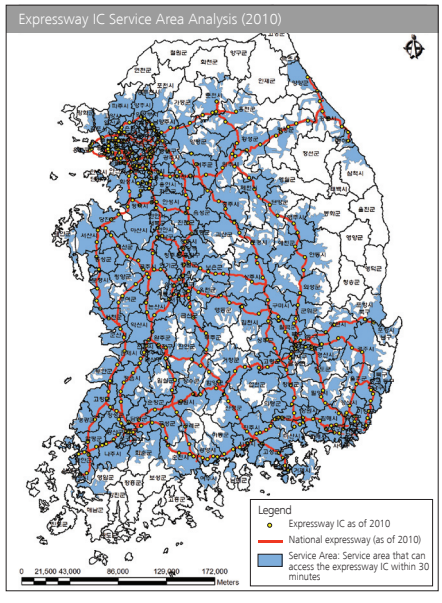
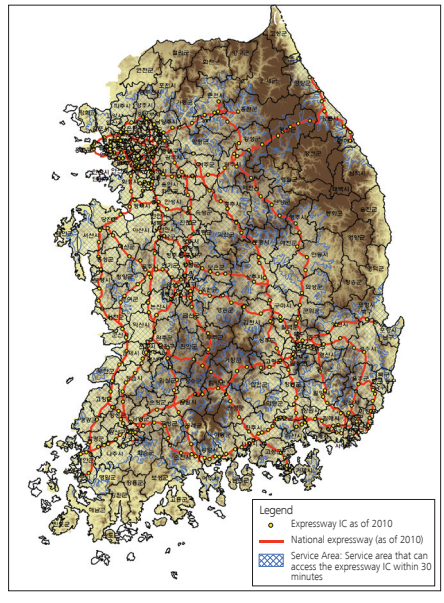


Figure 6 Expressway IC Service Area (SA)

Expressway IC service area	Expressway IC service area & digital elevation model (DEM)





This study also evaluated the average travel time based on the standard time of 262.5 minutes to meet the policy objective of enabling a round trip between any regions of the country within half a day. As a result, the average travel time without reflecting traffic jam exceeded the standard time in part of the remote areas of Jeonnam Region, as of 2009. But it was analyzed that all regions will meet the standard average travel time without reflecting traffic jam by 2021. The analysis on the average travel time reflecting traffic jam shows that Gangwon Province, remote areas of Jeonnam Region, part of Busan/Ulsan, and Geoje exceeded the standard time. Unlike the analysis based on the year of 2009, in particular, part of the northern Gyeonggi Province are expected to join the regions that exceed the standard time in 2021.

Figure 7 Average Travel Time between Regions (2006) : Without Reflecting Traffic Jam

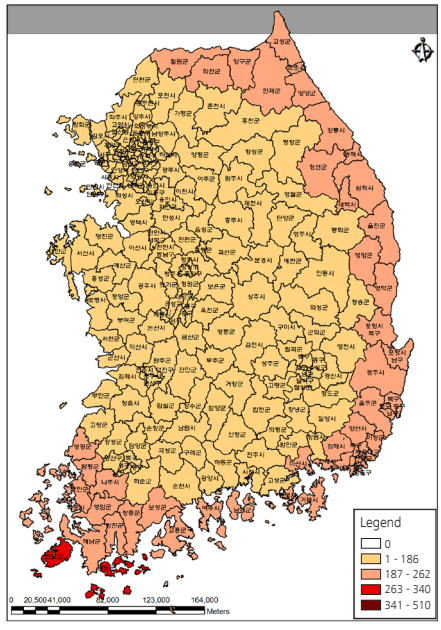


Figure 8 Average Travel Time between Regions (2009) : Without Reflecting Traffic Jam

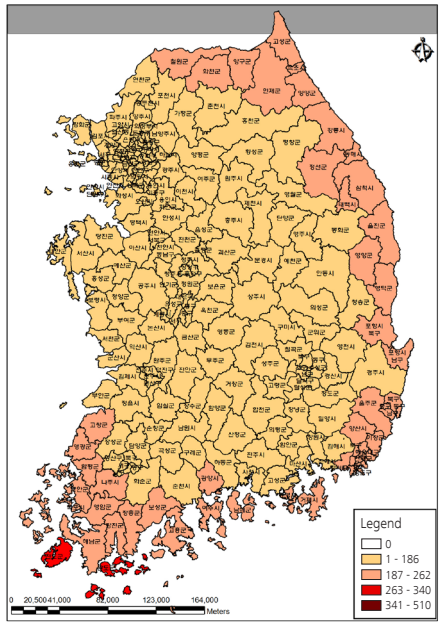


Figure 9 Average Travel Time between Regions (2021) : Without Reflecting Traffic Jam

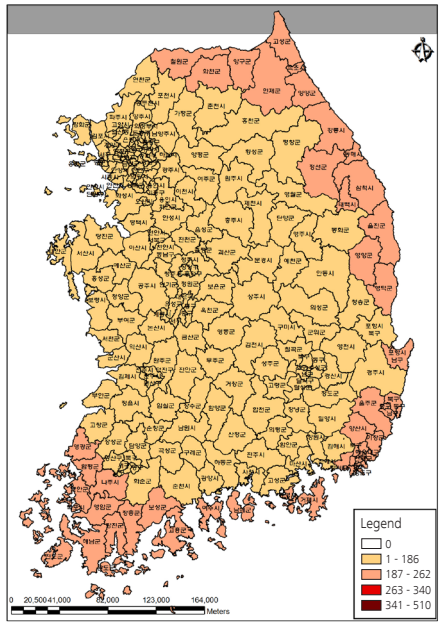


Figure 10 Average Travel Time between Regions (2006) : Reflecting Traffic Jam

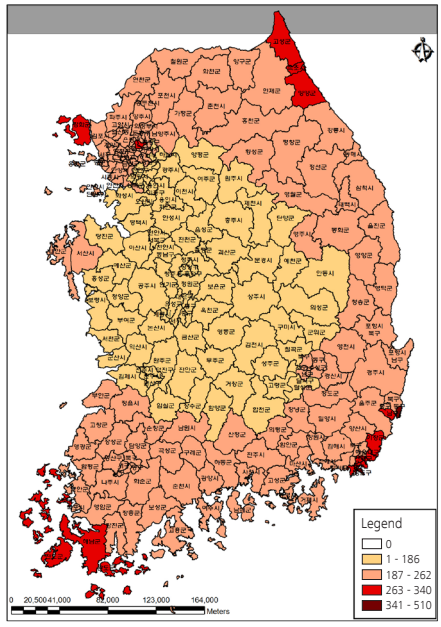


Figure 11 Average Travel Time between Regions (2009) : Reflecting Traffic Jam

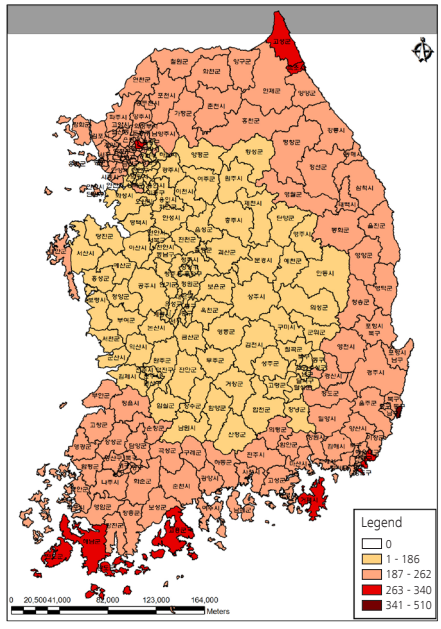
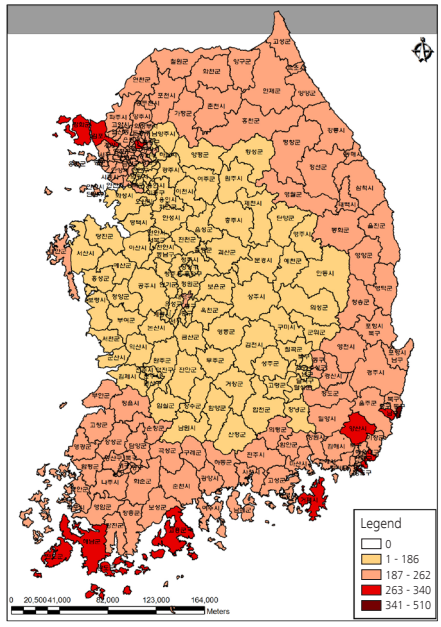


Figure 12 Average Travel Time between Regions (2021) : Reflecting Traffic Jam



Meanwhile, the evaluation on the number of nodal points between roads shows that Chungbuk Region has the smallest number of nodal points and expressway ICs. In terms of city/county/district, the northern area of Gangwon, part of Gyeongbuk, southern area of Jeonnam, and the northern area of Gyeonggi have less than 3 nodal points that are relatively lower than other regions. The main reason would be the lower supply of road service due to the geographical locations in mountainous areas or at the end of the national territory.

Figure 13 The Number of Nodal Points and Expressway ICs by Region

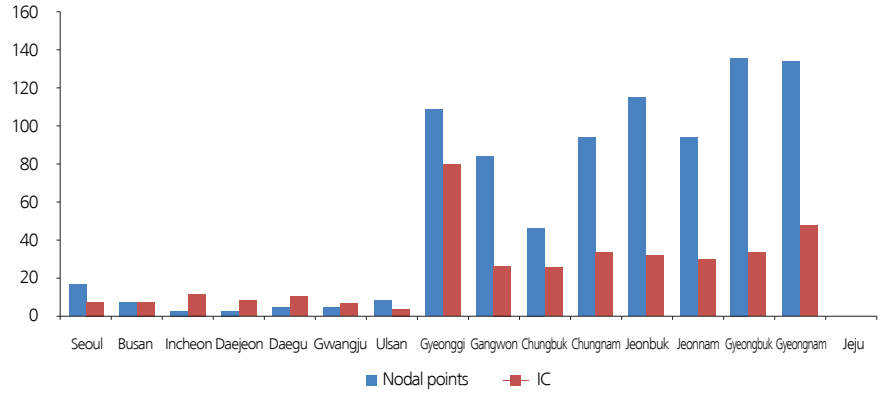
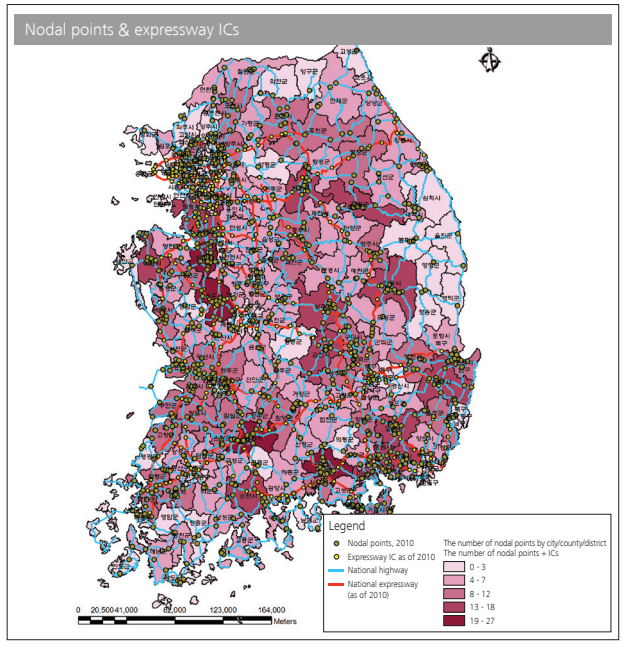


Figure 14 The Number of Nodal Points + Expressway ICs



2) Evaluation according to the minimum standard based on the minimum transport expense

(1) Basic assumption

This study assumed the travel distance available at the minimum cost of living to be 7.39km, 6.05km, and 44.40km. The travel distance available at the minimum cost of living was calculated through the method in the table below.

Table 19 Daily Travel Distance Available at the Minimum Cost of Living (Minimum Transport Expense)

Classification	Daily transport expense	Fuel efficiency[9]	Oil price[10]	Daily transport expense/oil price	Available travel distance (km)
Transport expense (average)	1,152	12.27	1,914.4	0.6	7.39
Intra-city bus	944	12.27	1,914.4	0.5	6.05
Average expense of taxi/express bus	6,928	12.27	1,914.4	3.6	44.40

Note 1: Daily transport expense was calculated by dividing the transport expense which is based on the minimum cost of living as of 2011 by the working days of 25 days.

Note 2: The average transport expenses of intra-city bus and taxi/express bus were calculated based on the unit cost of transport in terms of the minimum cost of living.

9) Data source: Analysis on the Level of Energy Consumption Efficiency in Vehicles for the Year of 2009, Ministry of Knowledge and Economy, 2010

10) Data source: Opinet (oil price information service), as of June 17th, 2011

Table 20 Calculation Method of Daily Travel Distance Available at the Transport Expense based on the Minimum Cost of Living

[Reference] Calculation method of daily travel distance available at the transport expense based on the minimum cost of living

- The daily travel distance available at the transport expense based on the minimum cost of living differs by standard. In this study, the daily travel distance was divided into travel distance available at the transport expense (average), travel distance available through intra-city bus, and the average travel distance available through taxi/express bus. The travel distance was calculated through application of the average fuel efficiency and average oil price of passenger cars.
- For calculation of transport expense (average), transport communication expense of a one-person household was first calculated based on the ratio of transport communication expense among the 11 items of the minimum cost of living. The daily average transport expense was calculated by dividing the pure transport expense out of the transport communication expense by 25 days.
- The average transport expenses of intra-city bus and taxi/express bus were calculated through application of the unit cost of transport (KRW 944 for intra-city bus, KRW 5,156 for taxi, KRW 8,700 for express bus) presented by the Study on the Estimation of Minimum Living Cost for the Year of 2010."

(2) Data establishment and evaluation method

This study analyzed the service area created along the travel distance available at the minimum cost of living by dividing the center of the region into the areas based on the location of each city/county/district office and the areas based on the geometric center of the administrative boundary's closed surface. The reason for conducting the analysis based on the geometric center of the administrative boundary's closed surface is to take into account the case where the administrative office is not located within the same administrative areas.

(3) Evaluation result

In the evaluation, the capital metropolitan city and local metropolitan city such as Seoul and Busan showed relatively proper overlapping ratio between service areas and the administrative areas. The evaluation on the overlapping ratio between service areas and administrative areas for each province shows that Gangwon Province has the most inadequate ratio.

Meanwhile, there is an error between the service areas based on the minimum living cost and expressway IC service areas. This means that expressway IC does not exist within the region where people can travel at the minimum living cost, implying that the residents cannot use the highest-level road infrastructure service when traveling between regions.

According to the analysis, approximately 10~30% of the population cannot use the road infrastructure service depending on the service standard at the minimum living cost.

Figure 15 Service Area & Ratio based on the Minimum Living Cost (Transport Expense) by Region: Based on the Center of the City/County/District Offices

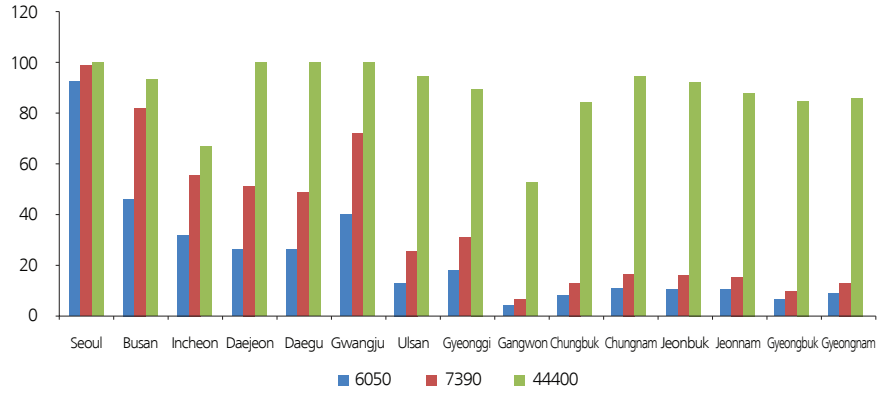
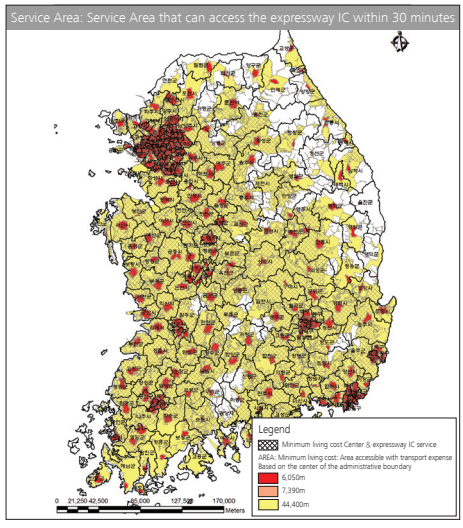
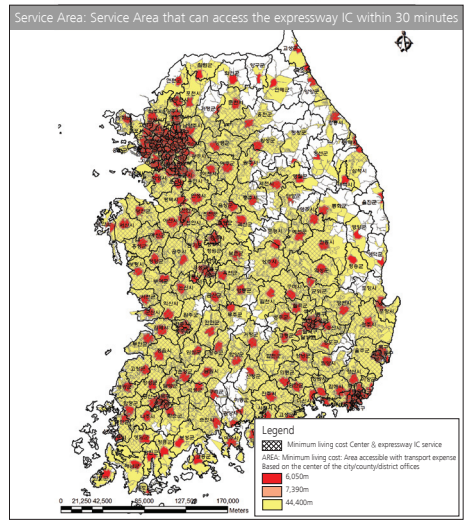


Figure 16 Service Area of the Minimum Living Cost (Transport Expense) & Service Area that can Access the Expressway IC within 30 Minutes

Based on the center of the administrative boundary	Based on the center of the city/county/district offices
	

3) Evaluation according to the minimum standard based on the basic settlement area

(1) Basic assumption

This study aimed to evaluate road accessibility of basic living facilities for people to lead "a healthy and cultural life", among the 31 items in 8 areas presented by the service standard for agricultural and fishing villages. Considering the availability of data and the possibility of GIS DB establishment for the regions across the country, this evaluation is based on 5 items including health and medical service, emergency service, and cultural leisure activities (purchase of medicine and medical supplies, emergency service, fire-fighting service, police service, cultural facilities and programs). The standard access time presented by the 'service standard for agricultural and fishing villages' was used as the minimum service standard for each item. In other words, this study evaluated whether the time taken to access road from the center of the region (location of the city/county/district offices) meets the standard access time to each basic living facility presented by the service standard for agricultural and fishing villages.

Table 21 Basic Living Facilities & Service Standard Access Time

Basic concept	Areas	Relevant items	Service facilities	Service standard access time (minutes)
Healthy	Health & medical services	Purchase of medicine and medical supplies	Public health center, branch offices of public health center, etc.	20
	Emergency	Emergency service	Emergency medical center	30
		Fire-fighting service	Fire station	5
		Police service	Police station, police substation, etc.	5
Cultural	Culture & leisure	Cultural facilities and programs	Cultural art center	30

(2) Data establishment and evaluation method

The GIS DB was established for each relevant item, through comprehensive review of 1:25,000 or 1:5,000 scale digital maps, data from relevant government institutions, and the map data from the Internet portal web sites. The GIS DB for fire-fighting and police services was established through extraction of only the layers of relevant items on the digital map. The GIS DB for the purchase of medicine and medical supplies, emergency service, and cultural facilities was established through acquisition of coordinate information of X and Y based on the use of geo-coding tool, after the establishment of address information provided by the relevant institutions and organizations. The GIS DB for each relevant item shows that there are 253 public health centers, 474 emergency medical centers, 2,484 fire stations, 3,360 police stations and 168 cultural art centers. These items were analyzed through the OD Cost Matrix tool of the GIS Network Analyst. In other words, if the temporal distance from the location of city/county/district offices to the most adjacent facility is within the access time defined by the service standard, then the relevant area was assessed to be compliant with the service standard.

Table 22 DB Establishment Method & Data Source for Relevant Evaluation Items

Areas	Relevant items	Service facilities	DB establishment method	Data source
Health & medical services	Purchase of medicine and medical supplies	Public health center, branch offices of public health center, etc.	Geo-coding	Ministry of Health & Welfare, Korea Health and Welfare Information Service (http://www.bokjiro.go.kr/data/statusView.do?board_sid=297&data_sid=150899)
Emergency	Emergency service	Emergency medical center	Geo-coding	National Emergency Medical Center (http://www.nemc.or.kr/index.jsp)
	Fire-fighting service	Fire station	Digital map	National Geographic Information Institute
	Police service	Police station, police substation, etc.	Digital map	National Geographic Information Institute
Culture & leisure	Cultural facilities and programs	Culture & art center	Geo-coding	Korea Cultural & Arts Centers Association (http://www.nacac.or.kr/)

(3) Evaluation result

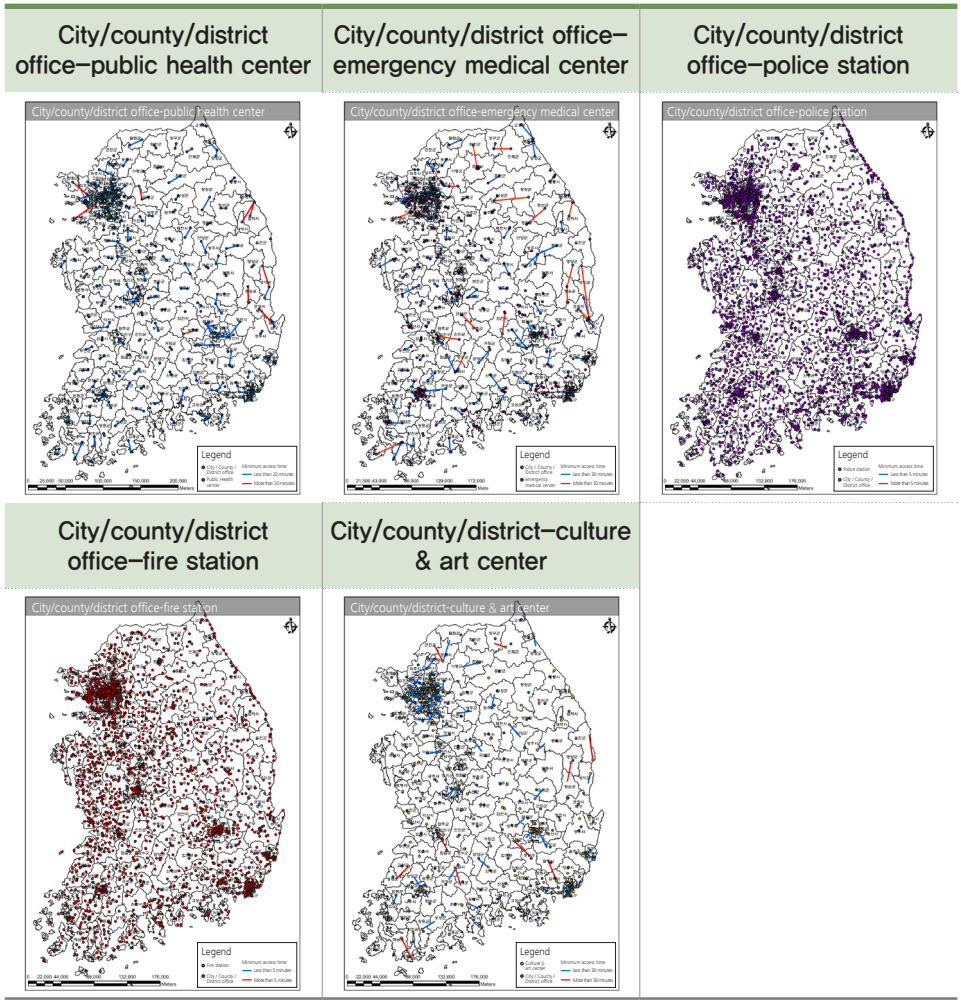
As a result of the evaluation on the average access time to each basic living facility, most of the evaluation items satisfied the standard access time. Detailed evaluation result is as follows.

In the case of pubic health centers, the average access time is 9.67 minutes while the average access distance is 9.62km, which is 52% of the standard access time of 20 minutes. And 87.95% (219 cities/counties/districts) of the 249 cities/counties/districts in total satisfied the standard access time. In the case of emergency medical centers, the average access time is 10.60 minutes while the average access distance is 11.04km, which is 65% of the standard access time of 30 minutes. And 92.37% (230 cities/counties/districts) of the 249 cities/counties/districts satisfied the standard access time. In the case of fire stations, the average access time is 1.57 minutes while the average access distance is 1.18km, which is 68.6% of the standard access time of 5 minutes. And 98.80% (246 cities/counties/districts) of the 249 cities/counties/districts satisfied the standard access time. In the case of police stations, the average access time is 1.00 minute while the average access distance is 0.73km, which is 80% of the standard access time of 5 minutes. And 99.60% (248 cities/counties/districts) of the 249 cities/counties/districts satisfied the standard access time. In the case of culture & art centers, the average access time is 7.03 minutes while the average access distance is 6.47km, which is 77% of the standard access time of 30 minutes. And 94.78% (236 cities/counties/districts) of the 249 cities/counties/districts satisfied the standard access time.

Meanwhile, Gangwon, Jeonnam, and Gyeongbuk regions failed to meet the service standard for each basic living facility, compared to other regions. In terms of the accessibility to public health centers, Gangwon, Jeonnam, Gyeongbuk, and Jeonbuk regions had lower accessibility than other regions. In terms of the accessibility to emergency medical centers, Gangwon, Jeonbuk, Gyeongbuk, and Jeonnam regions had lower accessibility than other regions. As for the accessibility to fire stations, all cities and counties excluding Wonju City, Gunwui County, and Ulleung County satisfied the service standard. In terms of the accessibility to police stations, all cities and counties excluding Ulleung County met the service standard. The evaluation result for Ulleung County is related to the incomplete road network data, while the evaluation result for Wonju City and Gunwui County seems to be related with a simple error caused by the location of city/county/district offices. Therefore, it would

suffice to conclude that all cities and counties satisfied the service standard. In terms of the accessibility to culture & art centers, Gangwon, Jeonnam, Gyeongbuk, and Jeju regions had lower accessibility than other regions. Among metropolitan cities, Incheon Metropolitan City shows a lower accessibility than other metropolitan cities, probably due to the low accessibility from its island areas such as Ongjin County and Ganghwa County. The service access time between the center of the city/county/district offices and the basic living facilities is represented through GIS, as in the figure below.

Figure 17 The Minimum Access Time between City/County/District Offices and Basic Living Facilities



3. Development & Evaluation of Road Poverty Index (RoPI)

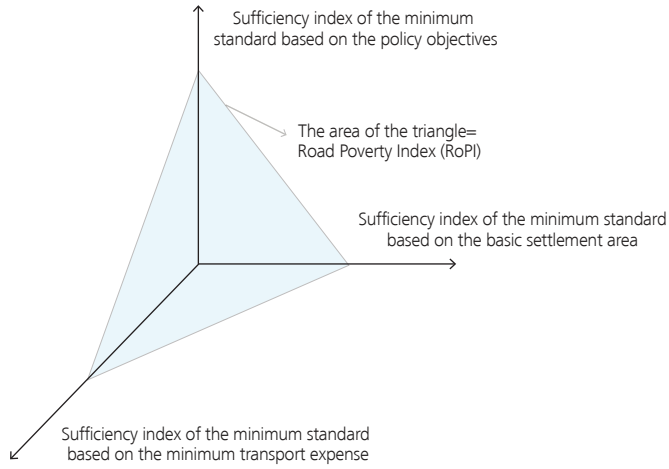
1) Concept

It is necessary to summarize the diverse analysis results of the current transport service based on each minimum service standard into a single index, in order to enhance efficient use of such analysis result for policies. As this study analyzed transport service including the accessibility of road infrastructure from the minimum standard perspectives, each analysis result shows whether the transport service is insufficient or sufficient. Therefore, a single index encompassing the diverse analysis results can represent whether or not the transport service satisfies the minimum service standards that were evaluated in diverse ways. In this study, such a single index is called Road Poverty Index (RoPI), which is a new index proposed by this study and is based on the word 'poverty'. RoPI refers to the poor status of road service, the infrastructure subject to this study.

2) Calculation method

The sufficiency index (X) of the minimum standard based on the basic settlement area was estimated through comprehensive review of whether the evaluation items related to the basic settlement area such as health and medical services, emergency medical center, fire station, police station and culture & art center satisfy the evaluation standards in each city/county/district. In other words, among the five evaluation items, the ratio of items satisfying the evaluation standards was converted to percentage, which was then converted to Z-Score to estimate the sufficiency index (X).

Figure 18 Conceptual Framework of Road Poverty Index (RoPI)



The sufficiency index (Y) of the minimum standard based on the minimum transport expense was estimated, based on the ratio of service area accessible with the minimum cost of living to the total area of the city/county/district. The minimum transport expense was analyzed under the assumption that the center of the region shall be the location of city/county/district offices, in order to apply the same standard as in the analysis of the basic settlement area. Considering that the index covers metropolitan service (inter-regional road service), this study set the standard to be 44,400m. The ratio of service area accessible with the minimum cost of living to the total area of the city/county/district was converted to percentage, which was then converted to Z-Score to estimate the sufficiency index (Y).

The sufficiency index (Z) of the minimum standard based on policy objectives was estimated through comprehensive review of the following three evaluation items for each city/county/district; IC accessibility within 30 minutes as described in the expressway policy objectives, achievement of the policy objective of enabling a round trip between any regions nationwide within half a day, and the number of nodal points between national roads that are aimed at connecting regions to achieve a network of roads running in all directions. In other words, the IC accessibility within 30 minutes was calculated based on the ratio of service area that can access IC within 30 minutes

to the total area of each city/county/district through the service area analysis. The achievement of the policy objective of enabling a round trip between any regions nationwide within half a day was estimated through review of whether the travel time between zones meets the standard time to achieve the policy objective. Among the results estimated through the EMME3 analysis, Road Poverty Index was analyzed based on the year of 2009 and of 2021. The calculation of Road Poverty Index is also based on two scenarios where one scenario does not reflect traffic jam while the other scenario reflects traffic jam. The number of nodal points was calculated by adding the number of nodes between national roads and the number of expressway ICs for each city/county/district. Values of these three evaluation items were normalized to get the Z-Score value, and the average Z-Score value was calculated as the sufficiency index. The reciprocal number of the area of the triangle, which is composed of three axes of the sufficiency indexes, is called Road Poverty Index.

Although the index should serve as a criterion with a single value, each value of X, Y, and Z could be both negative and positive values for the Road Poverty Index. The interpretation and content of Road Poverty Index could become different depending on the 8 directions of the sides of the triangle, although the value of the index would be the same. This makes it difficult to reach a conclusion with each sufficiency index. Therefore, each sufficiency index value was added with the minimum value to remove the negative value and the relevant distribution was moved to positive numbers, in order to calculate the Road Poverty Index. That is, the Road Poverty Index is calculated based on the triangle, which is composed of three axes of X, Y, and Z, using each sufficiency index as the coordinate. Length of the three sides of the triangle was calculated through the Pythagorean theorem for a right triangle. Based on the length of the three sides, the area of the triangle is calculated through ‘Heron’s formula’. The area of this triangle refers to the area of the triangle composed of each sufficiency index. Therefore, the Road Poverty Index is calculated based on the reciprocal number of the area of the triangle.

3) Calculation result

The Road Poverty Index can be differently interpreted, depending on the value of the index. If the Road Poverty Index is high, it means that the road service is poor. In other words, the higher the Road Poverty Index is, the poorer the road service is in the relevant region. As a result of the Road Poverty Index calculation, the northern areas of Gyeonggi/Gawngwon Regions, inland areas of Gangwon Region, the east coastal areas of Gyeongbuk Region, and the coastal and island areas of Jeonnam Region showed higher Road Poverty Index. This is attributable to the geographical features, as those regions are located in areas that are lack of road supply itself such as expressway, or at the end of the national territory.

In terms of the average value and standard deviation by scenario, the Road Poverty Index of 2021 decreases compared to that of 2009, which means that the road service will be improved in the future through road planning. The scenario reflecting traffic jam for 2009 and 2021 showed higher standard deviation than the scenario that did not reflect traffic jam. The standard deviation increased from 0.1390 to 0.1739 as of 2009 and from 0.0414 to 0.0444 as of 2021, which implies that the road service gap between regions increases when reflecting traffic jam.

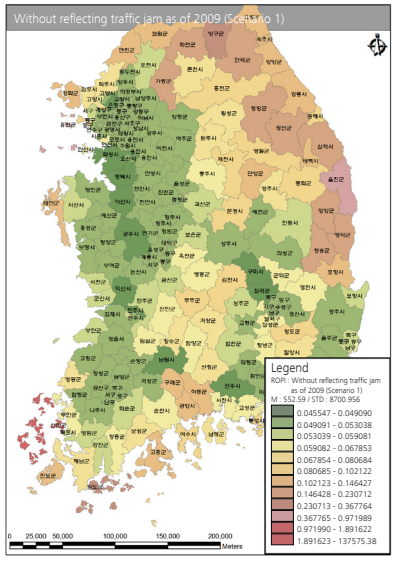
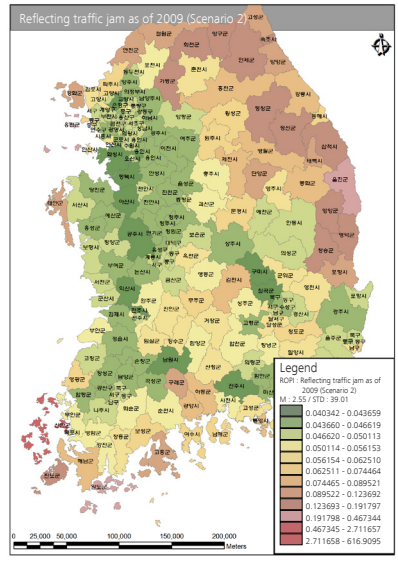
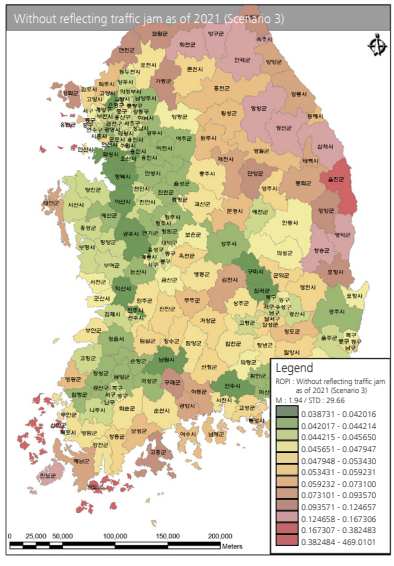
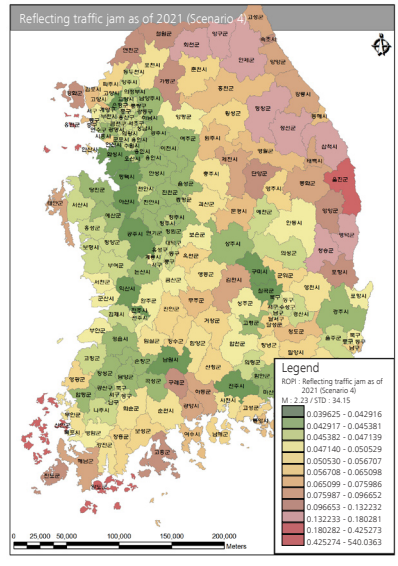
Table 23 Average Value & Standard Deviation by Scenario

Classification	Without reflecting traffic jam as of 2009 (Scenario 1)	Reflecting traffic jam as of 2009 (Scenario 2)	Without reflecting traffic jam as of 2021 (Scenario 3)	Reflecting traffic jam as of 2021 (Scenario 4)
Average value	0.0810	0.0740	0.0608	0.0626
Standard deviation	0.1390	0.1739	0.0414	0.0444

Note) The average value and standard deviation above exclude Ulleung County.

The relative distribution of Road Poverty Index across cities/counties/districts for each year also shows that Gangwon Region, costal areas of Gyeongbuk and Jeonnam Regions, and island areas of Ulleung, Taean, and Ganghwa Counties showed a relatively higher Road Poverty Index. The figure below is the Road Poverty Index Map that represents the overall status of road service nationwide.

Figure 19 Road Poverty Index Map

Without reflecting traffic jam as of 2009 (Scenario 1)	Reflecting traffic jam as of 2009 (Scenario 2)
	
Without reflecting traffic jam as of 2021 (Scenario 3)	**Reflecting traffic jam as of 2021 (Scenario 4)**
	

4. Summary of Evaluation Result & Implications

With constant expansion of road infrastructure including expressway and national highway, the policy objectives of enabling a round trip between any regions nationwide within half a day and of ensuring the accessibility to expressway ICs have been achieved to some extent. In terms of providing the minimum road service equally to all regions across the country, however, there are some regions where the road service level is lower than other regions, due to their geographical features. Such regions with poorer road service include the regions located at the end of the national territory including Gangwon and Jeonnam Regions. From the minimum service perspective of enabling a round trip between any regions nationwide within half a day, this study found that there are more regions that fail to meet the minimum standard under the scenario reflecting traffic jam than under the scenario that did not reflect traffic jam. And, some of the large metropolitan areas or part of the areas that pass through large metropolitan areas also failed to meet the minimum standard.

This analysis result could be used as a basis to carry out customized improvement measures for each region that failed to satisfy the minimum standard. For example, large metropolitan areas with serious traffic congestion need road policy measures to resolve such traffic jam or congestion. On the other hand, regions that failed to meet the minimum standard due to their geographical locations need to review physical policy measures, such as establishment of smart IC and branch lines of national road for expanding the basic traffic network and improving the links between roads, as well as the review on alternative inter-regional transport facilities.

From the perspective of ensuring the accessibility to expressway ICs within 30 minutes, the service areas are centered around the areas that pass through the expressway. Therefore, the number of service areas should be increased through constant projects to achieve 7×9, which is the major frame of the national artery road network. However, such projects should go through careful feasibility review, since most of the areas without expressway have potential environmental issues due to the conflict with Baekdu-daegan and economic issues due to the lack of demand for inter-regional transport service. These regions will need an investment plan to reinforce the links between roads through installation of smart IC and improvement of missing links, as well as to enhance road mobility through improvement of local roads such as

provincial roads, etc.

It was analyzed that there are many constraints in using expressway and national highway within the area that can be accessed at the minimum transport expense. And part of the regions across the country showed discordance between the expressway IC service area and the area that can be accessed at the minimum transport expense. In order to improve these issues, the government needs to provide financial support such as transport subsidies for low-income households, and increase the supply of lower-priced public transportation modes. As the government's financial resource is limited, the policy for such a financial support will need to be implemented in a phased manner with differential amount of support depending on the level of household income. The analysis result in this study can be used for setting such policies.

As a result of the evaluation on whether the people can access basic living facilities to lead a healthy and cultural life within the standard access time, most of the regions satisfied the standard access time but some of the regions failed to meet the standard. This is partially due to the lack of supply of basic living facilities. In the case of some of the basic living facilities, there were constraints in interpreting the analysis result due to the assumption of the analysis measuring the access time from locations of city/county/district offices to the facilities. However, this analysis result can be used as the basic data for assessing the accessibility of basic living facilities and establishing policies to supply additional facilities to the low-service areas and improve their accessibility to such facilities.

Meanwhile, this study developed Road Poverty Index to assess whether the road transport service meets the minimum service standard based on the analysis data of the current service level from diverse perspectives. This study created Road Poverty Index Map as well by using the value of Road Poverty Index. The Road Poverty Index was highly useful for understanding the status of road service in each region. This study also identified which aspects of the road service evaluation standards are insufficient based on the interpretation of the signs of each indicator and regional trends.

Chapter 03

Conclusion

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Conclusion

1. Utilization of Evaluation Result for Policy Establishment

1) Policy establishment using the evaluation result

Firstly, regarding the minimum standard based on the policy objectives, the government needs to consider the fact that most of the areas that cannot access the expressway IC within 30 minutes have unfavorable geographical features, where road construction does not have economic feasibility. In this regard, the government needs to seek measures to efficiently supply road infrastructure by diversifying the standards of expressway infrastructure. The government also needs to make a package investment in repairing motorway and reinforcing the links between local roads including the national highway connected to the expressway IC. For more efficient investment in roads, diverse policy measures should be identified, such as diversification of road infrastructure projects including the application of 2+1 road, construction of circular road to mitigate traffic congestion in large metropolitan area, installation of smart IC to reinforce links between roads, and creation of interchange (IC) space that can perform multiple functions, etc. Secondly, regarding the minimum standard based on the minimum transport expense, the government needs to seek diverse policy measures to ease the transport expense burden on the underprivileged people. Such policy measures include assessing the current status of the minimum

transport expense on a regular basis and providing transport allowance and vouchers. The government also needs to prepare a tax reduction policy using the minimum transport expense standard. Thirdly, regarding the minimum standard based on the basic settlement area, the government needs to increase the basic living facilities, prepare demand-based public transport policies, and provide a new transport service that is converged with information communication technology.

2) Measures for Modification of Laws/Regulations

Firstly, sub-laws (enforcement decree, enforcement rule) of the Framework Act on Transportation (Proposal) should be prepared. The current Framework Act on Transportation (Proposal) does not have a set of enforcement decree and enforcement rule, and has not yet presented specific indicators and standards for the minimum transport service. Although the current Framework Act (Proposal) states that national income, level of living culture, travel status, accessibility to public transport, travel time, and others should be comprehensively reviewed to establish indicators and standards. However, the elements to be reviewed are not specific enough. Therefore, the main analysis and evaluation result of this study can be used as the indicators and standards to measure/evaluate/manage the minimum transport service in preparing sub-laws of the Framework Act on Transportation.

Secondly, the 「National Transport System Efficiency Act」 should be amended. The survey of "the minimum transport expense" should be added to the items regarding the survey on the current status of travel by household among the items of national transport DB survey. The survey items should also include the minimum transport expense by household/individual, ratio of transport cost to income, level of transport cost burden, etc.

Thirdly, the government needs to review whether the Road Poverty Index can be applied to the regional underdevelopment index in terms of the preliminary feasibility study. Regional underdevelopment index is one of the indexes used in the preliminary feasibility study, which is aimed at reviewing the feasibility of large-scale development projects. The regional underdevelopment index currently has a quantitative indicator called road ratio indicator, which is related to the road supply to the relevant region and is calculated by dividing the road extension of the relevant

municipality by the size of the relevant administrative area. In assessing the regional underdevelopment level, Road Poverty Index will be more useful as a qualitative indicator representing the road service level than the simple quantitative indicator.

3) Financing and role-sharing system between governments

Guaranteeing the right to transport as the social right[11] would dramatically improve the people's right to mobility but at the same time would spend budget. If the right to transport is regarded as one of the government's welfare duties that should be urgently fulfilled, such as the minimum cost of living and the minimum wage, then many problems may arise, making the financial burden on the government heavier all at once.

Similar case examples including the overseas examples indicate that improvement of the minimum welfare standard and the government's financial burden lead to 'trilemma', which is a universal dilemma of welfare system. Trilemma is a terminology referring to a very difficult situation in which the government is faced with three incompatible issues of high welfare expenditure due to the increasing demand and expectation for welfare, slowdown of economic growth, and low tax revenue as percentage of GDP (the current generation's resistance to paying tax) along with the maintenance of fiscal soundness, in other words minimizing the burden that is shifted to the future generation.

There is an increasing demand for transport services to meet the minimum standard, high welfare expenditure of the government, and the people's resistance to paying tax for financing the welfare system. Under this situation, shifting the burden to the future generation through issuance of treasury bonds might further worsen the fiscal soundness of the government. Therefore, the following two ideas should be considered for resolving all of the 'three incompatible issues' described above.

Firstly, the government needs to consider establishment of the transport welfare

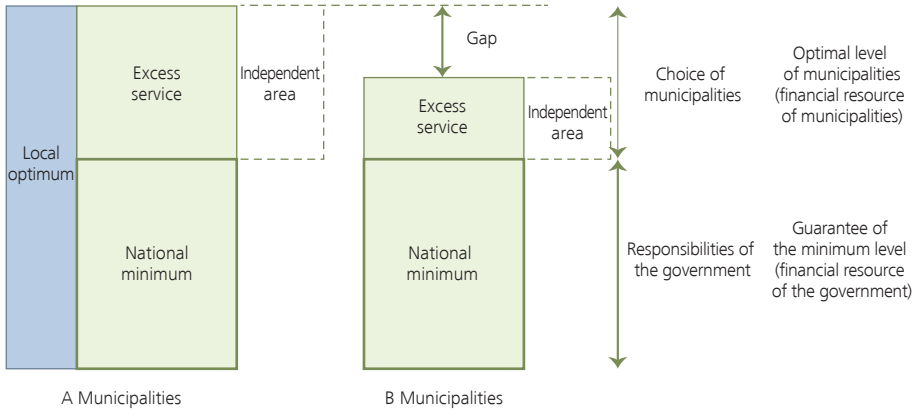
11) The right of the people to require the government to actively care for the people so that the people can maintain their survival or improve the quality of life to live 'a life with human dignity.' The social right is an active right that the people can demand compensation from the government when their rights are not fulfilled.

fund (a tentative name) for a sustainable financing system. It is important to prepare a sustainable financing system to offer road transport services from welfare perspectives. A good example of road service financing system would be the Highway Trust Fund (HTF) of the US that is being actively utilized for supporting the construction of the federal Interstate Highway System (IHS), which is the core of the US national artery road network. Meanwhile, the transport welfare fund should also be discussed as a new financing system enabling stable investment in transport sector such as Special Account for Transport Facilities in preparation for the repealing of Traffic/Energy/Environment Tax Act that is a law with expiration date (the end of 2012). Also, the government will need to review a new legal framework such as the 'Finance Act on Road Transport' where the major financial resource is the gasoline tax revenue in order to secure stable financial resource for road/transport investment.

Secondly, there should be a role-sharing system between the central government and local governments based on the concept of Local Optimum. In order to properly maintain the minimum transport service standard, they need to pay attention to Japan's Local Optimum that clarified the role-sharing between the central government and the municipalities. It would be more effective to adopt the Local Optimum concept[12] that takes into account each municipality's characteristics as well as their fiscal status. Also, it is more customized to the needs of the local residents, rather than the National Minimum concept that is applied the same to all regions' minimum transport services at national level.

12) Japan gave up the national minimum concept that had been the basis of its national land policy, during its transition from balanced development of national land to customized development of local municipalities. Japan is strongly supporting the local minimum concept, which promotes the optimal level customized to each region. (Park Gyeong, 2009).

Figure 20 Concept of National Minimum and Local Optimum



Data source: 道州制等に関する研究会(2002.12),
「分権型社会における地方の姿 - 道州制の実現に向けて」, 秋田県.

2. Implications & Future Tasks

1) Significance of the study

This study bears a significant meaning in that it is the first study to assess the road transport service from the new paradigm of welfare, going beyond the existing road investment evaluation focused on quantitative increase and efficiency of road facilities. The significance of this study also lies in the fact that it provided the following implications; the objectives and perspectives that should be the basis for the minimum transport service standard in terms of road welfare, and the evaluation standards for specific measurement and assessment of the minimum transport service.

This study will be able to contribute to improving the effectiveness of the Framework Act on Transportation by providing specific standards on the minimum road transport service for the study/evaluation of the minimum transport service in the future. This study will also make a contribution to the promotion of the right to transport and the improvement of universal transport service for the people, by offering the basic data for preparation of support for the areas that require transport service improvement.

2) Future tasks

Although this study focused on road infrastructure in discussing the minimum transport service standard, other transport services including the public transport and inter-regional railways will also need a set of minimum service standard. The three standards presented in this study could be used for setting the minimum service standard for other transport services. This means that other transport services will also need evaluation and analysis regarding the minimum standard based on policy objectives, the minimum standard based on the minimum cost burden of the service users, and the minimum standard required to live a basic life. For example, the three standards presented by this study can be used for evaluating the bus transport service, the most representative public transport. And the relevant evaluation indicators will be identified as in the table below.

Table 24 Evaluation Indicators for the Minimum Service Standard

Classification	This study (inter-regional roads)	Bus (public transport)
Minimum standard based on policy objectives	Access expressway IC within 30 minutes	Possible to use bus within the standard access time (access time to the bus station, areas covered by the bus routes, etc.)
	Enable a round trip between any regions across the country within half a day	Travel time by bus, waiting time for bus (allocation interval), transfer convenience, etc.
	Road service achieving a network of roads running in all directions	Areas covered by the bus routes, bus allocation interval (frequency), whether or not the bus station is included in diverse bus routes
Minimum standard based on the minimum transport expense	Road service availability at the minimum transport expense	Bus availability at the minimum transport expense
Minimum standard based on the basic settlement area	Whether people can access the basic living facilities through road within the service access time	The service access time taken by bus to use the basic living facilities or to live a basic life (commute to work, commute to school, business, shopping)

It will be possible to prepare the minimum standards for each transport service through a comprehensive review of the indicators above. Each municipality will also need to establish their own minimum standard customized to their circumstances by referring to the evaluation and analysis result of this study. More active discussions are required to establish the minimum transport service standards in diverse areas. The establishment of the minimum transport service standards should be based on the following perspectives.

Table 25 Diverse Perspectives to be Considered for Establishment of Minimum Service Standards

Universalism	vs.	Selectivism
Absolute		Relative
Quantitative		Qualitative
Quantity		Quality
Equal		Balance
Macro		Micro
Supplier-oriented		User-oriented
⋮		⋮
National		Local
National Minimum		Local Minimum

Note) Universalism: Social right regarding the service for all the people based on the philosophy of collectivism
Selectivism: Service usually limited to the underprivileged based on the philosophy of individualism

In addition, the government needs to create an environment, where the members of the society can reach an agreement and set policies by openly discussing the transport welfare service from the basic welfare principles of 'selectivism' and 'universalism.'

Table 26 Selectivism & Universalism

Standard for offering welfare service	Selectivism	Universalism
Philosophy	Individualism	Universalism
Desire	Personal desire	Social right
Service recipient	Service limited to the underprivileged, asset survey	Service for all the people
Effectiveness	- Cost effectiveness Provide the limited resources intensively to those who need the resources the most.	- Social effectiveness Respect human dignity and seek solidarity of the society, by providing the minimum service for all the people

Data source: Requoted from Gilbert and Specht, 1974, Mo Chang-hwan (2010)

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