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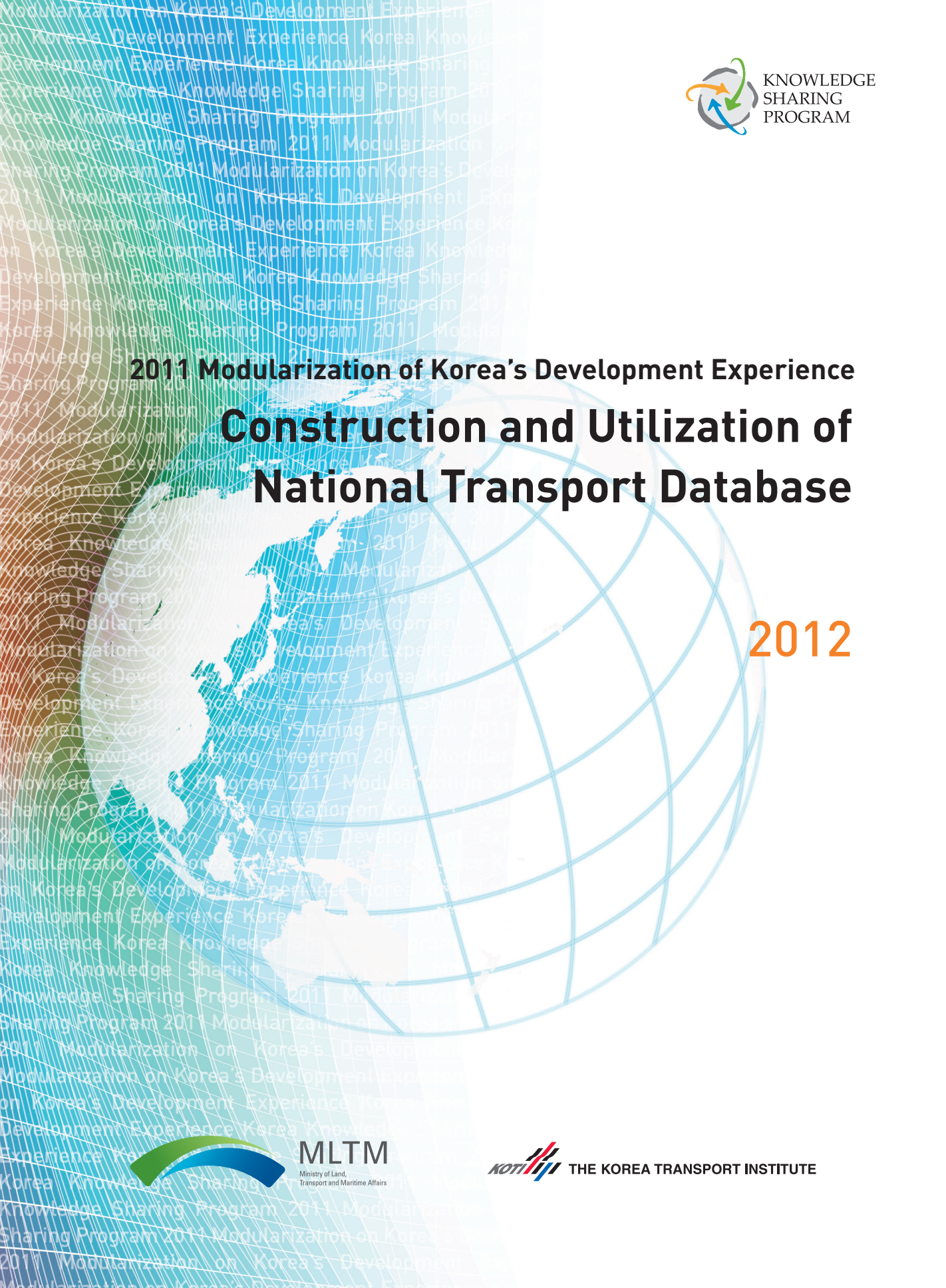
2011 Modularization of Korea's Development Experience

Construction and Utilization of National Transport Database

2012



MLTM
Ministry of Land, Transport and Maritime Affairs

KOTI THE KOREA TRANSPORT INSTITUTE

2011 Modularization of Korea's Development Experience:

Construction and Utilization of National Transport Database

2011 Modularization of Korea's Development Experience

Construction and Utilization of National Transport Database

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Preface

The study of Korea's economic and social transformation offers a unique opportunity to better understand the factors that drive development. Within one generation, Korea had transformed itself from a poor agrarian society to a modern industrial nation, a feat never seen before. What makes Korea's experience so unique is that its rapid economic development was relatively broad-based, meaning that the fruits of Korea's rapid growth were shared by many. The challenge of course is unlocking the secrets behind Korea's rapid and broad-based development, which can offer invaluable insights and lessons and knowledge that can be shared with the rest of the international community.

Recognizing this, the Korean Ministry of Strategy and Finance (MOSF) and the Korea Development Institute (KDI) launched the Knowledge Sharing Program (KSP) in 2004 to share Korea's development experience and to assist its developing country partners. The body of work presented in this volume is part of a greater initiative launched in 2007 to systemically research and document Korea's development experience and to deliver standardized content as case studies. The goal of this undertaking is to offer a deeper and wider understanding of Korea's development experience with the hope that Korea's past can offer lessons for developing countries in search of sustainable and broad-based development. This is a continuation of a multi-year undertaking to study and document Korea's development experience, and it builds on the 20 case studies completed in 2010. Here, we present 40 new studies that explore various development-oriented themes such as industrialization, energy, human capital development, government administration, Information and Communication Technology (ICT), agricultural development, land development and environment.

In presenting these new studies, I would like to take this opportunity to express my gratitude to all those involved in this great undertaking. It was through their hard work and commitment that made this possible. Foremost, I would like to thank the Ministry of Strategy and Finance for their encouragement and full support of this project. I especially would like to thank the KSP Executive Committee, composed of related ministries/departments, and the various Korean research institutes, for their involvement and the invaluable role they played in bringing this project together. I would also like to thank all the former public officials and senior practitioners for lending their time and keen insights and expertise in preparation of the case studies.

Indeed, the successful completion of the case studies was made possible by the dedication of the researchers from the public sector and academia involved in conducting the studies, which I believe will go a long way in advancing knowledge on not only Korea's own development but also development in general. Lastly, I would like to express my gratitude to Professor Joon-Kyung Kim for his stewardship of this enterprise, and to his team including Professor Jin Park at the KDI School of Public Policy and Management, for their hard work and dedication in successfully managing and completing this project.

As always, the views and opinions expressed by the authors in the body of work presented here do not necessary represent those of KDI School of Public Policy and Management.

May 2012

Oh-Seok Hyun

President

KDI School of Public Policy and Management

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Summary

Many countries in the world are implementing a database ("DB") through routine national transport surveys to make effective investments in transport infrastructure and establish transport policies. In Korea, the Transport Investment Evaluation Program was used as a basis for determining the validity of investment projects, but remained little more than a name until the 1990s due to the lack of investment funds for transport infrastructure. After 1999, however, policies for supplying transport infrastructure were planned and executed at excessive amounts, which raised concerns about potential overinvestment in the absence of improvements in relevant systems and institutions. This brought about a strong necessity for collecting and analyzing standardized and systematic preliminary data. In this regard, the Korean government introduced the National Transport Demand Survey and DB Construction Project in the Integrated Transport System Efficiency Act, a law of the highest authority in transport, which institutionalized the project. The project was initiated in 1999 at the central government level (the Ministry and Land, Transport, and Maritime Affairs) and the DB Construction Project is being conducted by the Korea Transport Institute as a government agency.

In Korea, it is necessary to look into transport investment projects before and after 2000. The investment project system in the past utilized transport demand prediction data, based the individual surveys for each transport investment project. This resulted in overestimating demand, due to the absence of standardized survey and analysis, as well as validation procedures. Improved investment project systems after 2000 institutionalized the implementation and use of data required for demand analysis, through the National Transport Demand Survey and DB Construction Project. These investment projects have been managed through standardized guidelines for survey, analysis and transport infrastructure investment evaluation. Since 2000, a minimum of 50 cases has been analyzed per year to determine the business value of projects related to transport infrastructure investments, including roads, railways, airports and harbors. This experience implies that random, overrun surveys could

be prevented with savings in related costs. In addition, the efficiency of a demand analysis and reliability of the eventual analysis outcomes were enhanced.

Essential details of the National Transport Survey and DB Construction Project are pronounced in the Integrated Transport System Efficiency Act (legislated in 1999). The Act states that this project is conducted to achieve a science-based way to conduct transport administration by systematically surveying and analyzing statistics, policy information, etc., as they relate to land, sea and air sectors. The project was also designated to implement this information into a national transport DB. A representative national transport survey is one that sheds lights on the O/D transport volume of passengers and freights, through which a given year's transport of passengers and freights can be analyzed. The following year's travel can also be predicted through such data, which is then implemented into a DB. In addition, national road and railway network databases are drawn up as electronic maps, and future networks can also be implemented. More than 50 transport demand analyses are carried out every year based on this kind of a transport DB, in which the business value of a new road/railway project is evaluated through a cost-benefit analysis. If the analysis indicates that there is some business value in a particular project, budgetary support from the government is then considered. Up to now, approximately 7 Billion KRW has been invested per year for the DB Construction Project, 40%-50% of which has been used as survey costs.

The reliability of national transport planning has been significantly improved by securing preliminary data necessary to establish and evaluate effective transport policies via national transport surveys and DB Construction. In addition, transport planning also provided a leading framework for integrated transport policies, including the establishment and execution of a 20-year national backbone transport network, as well as a validity evaluation of transport infrastructure projects. Moreover, it also contributed to minimize wasted government budget by preventing overlapping or piecemeal transport plans and project surveys through an improved transport survey, by procuring professionalism and consistency via standardization. In order to carry out the DB construction project effectively, mechanisms for consultation and collecting opinions between the government and related agencies/departments were established, through which medium- and long-term project plans can be executed. Although the DB construction project is supported fully by the national budget due to its government-driven nature, some projects, depending on the need for transport surveys and transport DB, are executive with cooperation from municipal governments by way of sharing budget and task-related obligations.

The Transport DB Construction Project was not seamlessly implemented from its beginning stages. Rather, a variety of difficulties and conflicts occurred during the course of the project that had to be addressed. The most significant difficulty was with the reliability of the implemented DB. To resolve this issue, researchers, scholars and consulting firms all participated to make significant contributions over a long period of time. In addition, the government constituted the "National Transport DB Inspection Team" as a separate

organization, in order to monitor the project, from project planning to final DB construction. A recent challenge has been the advancement and specification of the demand analysis. The current DB incorporates the whole country at the city/district/borough level (249), whereas the future DB aims at implementing the whole country more specifically, at the town/township/dong level (3500). A large change in survey and analysis schemes is expected with this shift. In addition to this challenge, workforce expansion and education have also not been without difficulties. Continuous effort has been made towards investing in education, since there is a lack of qualified experts for transport DB construction projects.

Korea, in which transport investment projects are carried out via national transport surveys and DB construction at the national level, can be an important example for countries conducting their own national SOC foundation projects, including transport infrastructure. Korea can be relevant for government-driven developmental countries that aim to prevent redundant surveys and carrying out a number of transport investment projects in a short time frame, by prioritizing projects based on assessments with reliable data. Efforts by the Korean Government to standardize transport investment evaluation programs, in addition to establishing, conducting and applying a legal basis for transport surveys, DB construction and investment evaluation guidelines for government-driven transport infrastructure investment can provide excellent implications to countries experiencing similar problems, or those looking to establish similar plans.

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Chapter 1

National Transport Survey and DB Construction Project: Background

1. Domestic and International Circumstances
2. Problems with Absence of National Transport DB
3. Beginning of National Transport DB

National Transport Survey and DB Construction Project: Background

1. Domestic and International Circumstances

The Korean government has made tremendous investment to expand and manage transport SOC. The reason for this investment was due to its fundamental goals for economic development and national welfare, together with enhanced industrial competitiveness. Transport was also the foundation for providing elementary services in production and distribution. Therefore, it is reasonable to state an adequate degree of SOC investment is an ideal way for a nation to provide public services.

Korea began its systematic SOC investment to support industrial production in 1962 with the first 5-Year Economic Development Plan. SOC investment was also supported by the Comprehensive Territory Development Plan, which was initiated in 1972, in addition to medium- and long-term plans such as the recent National Backbone Transport Network Plan. In order to secure and manage budget allocations for transport-related SOC investments, a significant amount of effort has been made, such as the Special Accounts for Transport Facilities in 1994. By the virtue of such efforts, Korea's SOC investment has been significantly increased since the 1990s.

During the initial phase of the 5-Year Economic Development Plan, SOC investment was made mostly for the railway sector. However, the focus was shifted to roads, which constituted 80% of the total SOC investment by the sixth 5-Year Economic Development Plan. Transport-related investment was significantly increased after the Special Transport Facilities Account was set up, which amounted to 13.5 trillion KRW by 2005. Even in the "National Budget Management Plan for Years 2006-2010," the investment budget for transport sector was estimated at 15 trillion KRW per year, with infrastructure investments being made accordingly.

Due to the foreign exchange crisis in 1997, an IMF management system was set into action, and Korea began to experience serious unemployment. Before 1998, Korea had maintained

a very low unemployment rate of 2% (corresponding to 0.4M-0.5M unemployed workers) for 10 years. However, the unemployment rate increased up to 7%, which amounts to 1.5M unemployed workers. To overcome the challenging domestic economic situation due to decreases in household income and unemployment, the government proposed employment plans based on its financial functionality. One such plan was the National Informatization Project, a foundation for the National Transport DB Survey and Implementation Project.

Informatization projects have been conducted at each government department, according to the Informatization Promotion Act (legislated in 1995, reinforced in 1996). As a part of this initiative, the National Transport Survey and DB Construction Project was initiated as a public employment project, to relate employment measures to informatization of public sectors. The aim was to support the reemployment of the workforce, as well as to implement the national transport DB via surveying preliminary data required to establish transport plans effectively.

Along with the government, private capital has participated in SOC investments as well. Indeed, private capital firms have contributed to the government's financial soundness by increasing Korea's national competitiveness by expanding SOC investments, increasing convenience for its citizens, and offering productive investments through the development of financial market. Nonetheless, there have been numerous criticisms that performance-driven but impractical projects have been forcefully pushed forward without thorough consideration. As a consequence, there has been an increasingly negative impression that these projects have resulted in financial burdens to the government and the people, and have consistently failed to draw social consensus about their merits. In particular, it has been pointed out that evaluating a project's validity prior 2000 has been very unreliable because of the unavailability of a DB, based on systematic transport volume surveys and research analyses. As a result, a necessity arose to produce a survey of preliminary data and implement a DB system, with which reasonable and accurate transport demand analyses could be performed at the national level.

2. Problems with Absence of National Transport DB

2.1 Random Individual Transport Surveys

Data required for transport policy are collected using surveys. The history of transport survey in Korea is relatively short compared with that of developed countries. Thus, it experienced inefficiency problems in the absence of a systematic establishment of transport surveys. The most serious problem was overlapping surveys. Since individual surveys were repeatedly enforced in fragments according to each specific central government or municipal government projects, budgetary waste was inevitable due to the lack of professionalism and consistency. Moreover, issues related to the effectiveness of surveys and a questionable utilization of results were also cited, which also resulted budget waste, as well as the inability to systematically and comprehensively organize survey data obtained from random individual surveys.

In addition, issues were brought up in regards to the objectivity of transport survey results, stemming from the peculiar absence of standardized survey and analysis methods. In fact, it was difficult to exchange data and establish objectivity among different surveys, due to the divergent methods used by different investment bodies. As a representative example, classification of vehicles used in transport volumes on freeways and highways was inconsistent, and classification of vehicles itself was different for various municipal governments, which altogether led to difficulties when it came to deriving national transport volume numbers. Problems like these were typical, making it extremely difficult to achieve objectivity and consistency of results without the legislation and enforcement of standardized transport survey guidelines.

Lastly, there were problems related to being without a comprehensive government plan on national transport surveys. The master plan set by the central government, such as the medium- and long-term survey plan, was not reflected into its budgetary and business plans, making it impossible for municipal governments, as well as related organizations, to effectively manage national transport surveys. This was in contrast with the practice of foreign countries, which enacted and executed a large-scale survey on airliners and freight planes every five years, or small-scale surveys on a yearly basis.

The government of Korea was therefore required to perform renovations on various systems to prevent the waste and inefficiency caused by sporadic and unsystematic transport surveys, to share a range of interchangeable survey results in the future.

2.2 Inefficient SOC Investment Evaluation System

Since the 1990s, the Korean government has made continuous investments on transport facilities, with the aim of enhancing national competitiveness. As a result, the SOC stock level in Korea increased significantly. For instance, freeways increased by 26.6% between 1980 and 1990, and also increased by 143% between 1990 and 2009. This resulted mostly from the expansion of financial investments by the central government to vitalize the economy and save the distribution costs. Municipal governments, public enterprises and the private sector also made SOC investments of approximately 10 trillion KRW per year, on top of the central government's contributions. In particular, contributions from the private sector increased dramatically (0.5 trillion KRW in 1998→2.1 trillion KRW in 2003). By virtue of all these investments, the net SOC investment in Korea has expanded significantly, from 22.8 trillion KRW in 1998 to 30 trillion KRW in 2003, 26.3 trillion KRW in 2007, and 27.3 trillion KRW in 2008.

Expansion in investments by the government and private sectors made significant contributions to business recovery, such as early recovery from the IMF crisis and the expansion of a national backbone transport network. Investments by the public sector during the IMF crisis were the most crucial for domestic business recovery, raising the net rate of GDP increase of –6.7% in 1998 to approximately 10% in later years.

Table 1-1 | Economic Situation before and after IMF Foreign Exchange Crisis

Classification	'97	'98	'99	'00
Net GDP Increase Rate (%)	5.0	Δ 6.7	10.9	9.3
Construction Order (T won)	88.2	52.8	58.1	56.1
- Domestic Order	74.9	47.1	47.2	49.9
(Public)	(33.3)	(29.6)	(27.2)	(26.8)

Reference : National Financial Management Plan (2004)

In addition, opening of the Incheon International Airport in 2001, as well as the expansion of main roads and the completion of the first phase of the Gyeongbu High Speed Railway and the electrification of the Honam Line Railway, shrunk Korea into a half-day life zone. In addition, the expansion of transport facilities capacity led to a relief on transport demands.

Despite continuous SOC investments by the government, however, the distribution costs and the congestion fees remain too high. Distribution costs have been steadily increasing since 1997. In particular, freight fees have exhibited drastic increases, by 163% over the past 10 years, reaching 140 trillion KRW in 2008. Similarly congestion fees have been steadily increasing, estimated to be 26.9 trillion KRW in 2008.

Table 1-2 | Trend of Congestion Fee and National Distribution Cost

(Unit: T won, %)

Classification	GDP (Current Cost)	National Distribution Cost		Congestion Fee	
Classification	GDP (Current Cost)	Cost	Weight w.r.t. GDP	Cost	Weight w.r.t. GDP
1993	290.7	41.2	14.2	8.6	3.0
1998	484.1	74.2	15.3	12.2	2.5
2000	603.2	94.1	15.6	19.4	3.2
2008	1,026.4	178.5	17.4	26.9	2.6

Reference : Korea Transport Institute, "2010 National Principal Transport Statistics," 2011

As illustrated above, any project must go through a pre-evaluation phase for the government to determine the level of transport infrastructure investments. Once the government establishes an investment plan, it then goes through a preliminary validity survey, followed by the full validity survey (transport infrastructure investment evaluation). The project is then executed by establishing and designing basic plans. Among these

surveys, preliminary validity survey is conducted for financial projects exceeding 50 billion KRW, and the Ministry of Knowledge and Economy serves as the main agent. The survey evaluation itself is carried out by the Korea Development Institute (Public Investment Management Center), related researchers and service companies. The full validity survey is led by the ministry in charge of the relevant infrastructure, and the institution responsible for each individual project performs survey and evaluation management together with service agents. However, this road infrastructure investment evaluation has revealed many shortcomings in predicting demand. For instance, the actual transport volume of the New Airport Private Sector Investment Freeway is only 41.4% of the predicted volume, and the actual transport volume of the Cheonan-Nonsan Freeway is only 47.1% of the predicted volume. This has resulted in continuous government expenditures of 105 billion KRW and 49 billion KRW, respectively, to aid shortcomings in operation revenues. Up to 2009, this kind of expenditures has amounted to 1 trillion KRW and 425.5 billion KRW for the seven projects under jurisdiction of the Ministry of Land, Transport, and Maritime Affairs.

The problem of insufficient reliability in investment evaluations stem mainly from the lack of fundamental statistical data, differences in demand prediction methods, and negligence in investment evaluation management, etc.

First, unreliable investment evaluations are due to the lack of transport statistics and standardized unit requirement data. In Korea, the amount of fundamental statistical data useful for transport infrastructure investment evaluations was insufficient. There was no standardized survey method, and fundamental unit requirement data useful for evaluations were also lacking. Each individual project conducted data collection for its required regions as needed by applying its own standards, which ultimately yielded insufficiency in fundamental transport statistics data. This was because a system that could put these data together simply did not exist.

Second, there was a difference in the transport demand prediction results. In the absence of fundamental data based on consistent standards and methods yielded different predictions for transport demand. In particular, different results can be drawn by divergent applications of analysis methods, especially if the evaluator's subjectivity can be applied to the analysis method used.

Third, there was an absence of an expert workforce and evaluation management system. Together with the primitive transport evaluation agencies, expert workforce capable of conducting investment evaluations could not be procured. Furthermore, a system to perform post evaluations on each individual validity analysis result was not available, which acted as a hindrance against a comprehensive analysis/management of evaluation results, and comparative evaluation management.

Fourth, in case of private sector investment projects, a hasty induction of systems and an impractical push for performance-oriented project constituted a reason for poor investments. Part of the reason for these problems was the induction of private sector investment systems, in order to supplement insufficient budget in initial stages, or to resolve some projects requiring political solutions.

2.3 Lack of Transport Policy and Plan-Supporting DB

Many countries establish and evaluate long-terms plans on comprehensive, medium- and long-term transport policies and investments. Korea also establishes and evaluates a variety of comprehensive transport plans, including the 20-year national backbone transport network plan and the 20-year national railway network plan. Korea also conducts validity evaluations of transport infrastructure projects every five years. Measures like the transport apportionment rate, one of the most important policy objectives in comprehensive plans, are the most fundamental measures. In addition, the transport sector's energy consumption and greenhouse gas emission, mileage, the need for sustainable transport distribution policies against climate change, are also indispensable fundamental data.

The Korean government experienced the deterioration of reliability in policies, due to the lack of fundamental data necessary for effective transport policies. As a result, it has certainly come to appreciate the importance of measures against these problems. In other words, the lack of collecting and reprocessing data that conforms fully to the aim of use results in insufficient data. These kinds of data cannot be directly utilized for primary policy objectives, such as the establishment of actual policies and plans, demand predictions, validity evaluations, etc. In particular, the lack of fundamental data was poignant for intermodal policies, redundant inter-means investments, sustainable transport distribution policies and more.

Also, the Korean government continuously suffered from underpricing problems associated with the use of transport infrastructure, since social cost was not considered in the investment. As the approach to determine transport infrastructure investments via evaluating efficiency gained more attention, the need for related costs was brought up. As a consequence, problems related to the absence of statistics on transport external costs, such as congestion fees and accident fees, were addressed.

3. Beginning of National Transport DB

Although it was making tremendous investments to expand transport infrastructure, the Korean government determined that inefficient investments were nonetheless being made, due to the lack of fundamental data necessary to validate the projects. The O/D transport volume, transport analysis, traffic fact data, etc. are the most fundamental data to verify the validity of transport infrastructure investments. However, the Korean government predicted that these problems could be overcome by securing reliable data and by utilizing a standardized DB, since survey methods, and the time needed to collect and analyze data, were different depending on the institutions, sectors, and projects involved. In particular, transport-related data suffered from a lack of periodic continuity, because they were conducted as one-shot surveys and were disposed after a single use. In addition, consistent data could not be arranged at the time. Therefore, the government decided that a basis for government-driven management of transport DB across the nation was required.

Accordingly, the Korean government started a project to build a transport DB in 1998, by conducting transport surveys at the national level and collecting fundamental transport data. At the same time, it introduced the Transport System Efficiency Act (currently the Integrated Transport System Efficiency Act) in February 1992, and enforced it in August 1992, to conduct transport surveys continuously, and implement a DB, thereby arranging a basis for utilizing evaluation of investment projects, among others.

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Chapter 2

National Transport Survey and DB Construction Project: Basis and System

1. Basis for Pushing Forward the Project
2. Project Promotion System and Procedure
3. Promotion Agents' Roles

National Transport Survey and DB Construction Project: Basis and System

1. Basis for Pushing Forward the Project

1.1 Legal Basis-Integrated Transport System Efficiency Act

1.1.1 Integrated Transport System Efficiency Act

This project has been executed based on the Integrated Transport System Efficiency Act, which was legislated as the Transport System Efficiency Act in 1999. This law was put in place to pursue investment plans on transport infrastructure, investment evaluation and transport system efficiently, to strengthen the comprehensive adjustment of transport policy, and also prepare economic resources for the expansion and management of transport infrastructure via the Transport Infrastructure Special Accounting Act.

This law enforces the National Backbone Transport Network Plan, the Transport Infrastructure Investment Plan, the Basic Plan for Intelligent Transport System, and others, in order to strengthen the comprehensive adjustment of transport policy and implement efficient transport systems across the country. In March 1998, the National Backbone Transport Network Plan was selected as a government project. In February 1999, the National Backbone Transport Network Project (2000~2019), a major transport plan in Korea, was founded through consultation with relevant authorities. Subsequently, the National ITS Basic Plan (2001~2020), the Phase 1 Medium-Term Transport Infrastructure Investment Plan (2000~2005), and the Phase 2 Medium-Term Transport Infrastructure Investment Plan were founded in 2000, 2001, and 2005, respectively.

The Integrated Transport System Efficiency Act is a law concerning the implementation of a comprehensive national backbone transport network. The National Backbone Transport Network Plan suggests the goal of implementing the project through phase-by-phase strategies, setting up, expanding and maintain the national transport infrastructure, in addition to implementing linked transport systems. It is a high-priority national law that supersedes

a wide-range of transport plans in metropolitan areas or other transport-related plans. It also aims at using its transport infrastructure investment plan for other national plans.

This law prescribes that transport surveys be carried out to carry out the national backbone transport network plan effectively. In addition, the law also recommends comprehensive management of individual transport surveys. Based on this law, the national transport DB can be utilized in planning and evaluating most domestic infrastructure investments in transport sector.

In July 2001, the Transport System Efficiency Act was partially revised. Partial amendments were made to the system. Guidelines on transport surveys were set to more efficiently implement and manage the national transport system, the national transport DB was implemented and managed, and basis for establishing special transport measures under a sudden increase in transport demands was arranged. Highlights of the amendments are as follows.

A. In order to secure the transport survey's objectivity and unity, the Minister of Construction and Transportation establishes transport survey guidelines standardizing methods and criteria of transport survey, and accordingly, promotes the cooperative share of transport volume survey results by virtue of constructing implemented transport survey results into transport data DB (Article 9, Section 2 to Article 9, Section 4, a new law).

B. In case there are serious problems in national transport management by such natural disasters and holidays, special transport measures with the content of transport vehicle run control, substitute route designation, etc. are established and implemented (Article 11, Section 2, a new law).

Since then, an overall revision was made in December 2009. The aim was to implement an integrated link system among land, sea and air transports, and to actively cope with climate changes in transport and distribution. Additional amendments were made, such as strengthening connected transport system by designating locations with large-scale connections of passengers and freights as transport distribution bases, setting up a basis for developing complex transfer centers that combines connected transport among transportation means and commercial functions, etc. From this point, it was renamed the Integrated Transport System Efficiency Act.

1.1.2 Integrated Transport System Efficiency Act Enforcement Ordinance

With the legislation of the Transport System Efficiency Act, items and their legal enforcement, such as the implementation of transport surveys, are defined. Among these, items related to transport surveys are as follows. The law prescribes that regular national transport surveys

be conducted every five years, and that transport means, status of transport infrastructure utilization, transport volume, type of freight transport, etc. be surveyed as well.

Article 6 (Transport survey implement)

① Under Article 9, Section 1, the Minister of Construction and Transportation should implement transport survey according to the next each clause's classification. In this case, the times considering marine transportation survey should be discussed with the Minister of Fisheries and Oceans in advance.

1. Transport survey over the nation: every five years
2. Transport survey over the specific areas: frequently implement if necessary

② Transport survey under Article 1 should include the following items.

1. Management and use realities of transport means and transport facilities
2. Transport volume of each transport means and transport facility
3. Transport congestion expense and energy consumption of each transport means
4. Passenger and freight transport types
5. Other necessities for transport related policy and plan establishment

Later, the enforcement ordinance was revised with revisions to the law itself. The main objective of these revisions was to define additional items required to delegate and execute the law, in regards to the consultation procedure with the Minister of Construction and Transportation (currently, the Ministry of Land, Transport and Maritime Affairs) for enforcement of national and individual transport surveys. National transport surveys were classified into a routine survey across the nation, and spot surveys over specific areas and on specific purposes (Article 6, Section 1). After the routine survey, the national transport survey would to be published (Clause 6.4). In addition, in case of individual transport survey implementation by a public agency, it provided an institutional strategy to discuss with the Minister of Construction and Transportation in advance (Clause 6.3), and also required the preparation of transport survey guidelines for the purpose of transport survey standardization (clause 6.2).

Amendments were executed again in November, 2008. The range of national transport surveys was expanded, and national transport DB construction and transport survey related discussions, were established through the National Transport DB Council, composed of related public agencies. The national transport survey range included each transport expense, greenhouse gas, energy consumption, etc. to cope with domestic and international environment changes (enforcement ordinance 6).

1. Registration and utilization rates by every means of transport
2. Supply and management data such as routes, transport volume, mileage, etc. by every transport means and by every transport facility
3. O/D transport volume of passenger and freight by every transport means and by every transport facility
4. Transport and distribution cost of traffic use and transport facilities' investment, management and administration
5. Transport-related social external costs such as traffic congestions, traffic accidents, environmental pollution, greenhouse gas emissions caused by traffic distribution activities
6. Energy consumption and efficiency by every means of transport
7. Greenhouse gas emissions by every means of transport
8. Transportation record and division rate by every transport means and by every transport facility
9. Additional necessary details for transport-related policies and plans' establishment, transport facilities' investment analysis and evaluation

The National Transport DB Council was established through enforcement ordinance 6.5 to 6.8, and composed of 30 members among officials of relevant central and local government agencies, public agencies' members, related specialists, and others. The Council was required to discuss national DB construction and management issues through routine and temporary meetings. The main discussion issues are as follows (enforcement ordinance 6.7).

1. Connection and cooperation of transport survey and data collection
2. Connection system between national transport DB and collected data from public agencies' individual transport survey results
3. Efficient supply and share of transport survey data
4. Task improvement such as the standardization of transport surveys and national transport DB establishment methods
5. Improvement plans of national transport DB's utilization
6. Overlap prevention plans among transport surveys
7. Additional necessary facts to establish and manage national transport DB

In January 2012, the enforcement ordinance was renamed the Integrated Transport System Efficiency Act Enforcement Ordinance, according to the revision in law. It prescribes that central and municipal governments can conduct transport surveys together. In case of overlap between individual and government transport surveys, the chief of the municipal government asks for participation in a collaborative national transport survey with subsidization of partial costs. On this legal basis, collaborative surveys were carried out in metropolitan areas in 2010. Also, central government and municipal governments have been conducting the analysis of survey results and O/D transport volume implementation project in 2011 together.

1.2 Institutional Basis-National Transport Survey Plan

1.2.1 Basis for Establishing National Transport Survey Plan

The National Transport Survey and DB Construction Project are institutionally based on the National Transport Survey Plan, under Article 12, Section 2. In the beginning, by virtue of the second 5-year stage project completion, the national transport DB's foundation was laid and real practical application was implemented. But in accordance with the interior and exterior demand to establish the project's mid and long term performance systems, the National Transport Survey was reviewed. Accordingly, in March, 2008, the related content was founded at the transport system efficiency law (Article 9, Section2), and the national transport survey plan establishment was launched. The following is the legal provisions with regard to the national transport survey plan.

> Under Clause 16.1, for the efficient transport survey's implementation such as individual transport survey overlap prevention and the survey results' cooperative utilization, the Minister of Land, Transport and Maritime Affairs should establish the national transport survey plan considering the national transport survey's objectives and strategies by five years, detailed survey's contents and methods, through the deliberation of national transport council.

Under the premise of establishing medium- and long-term plans for the DB project, a systematic transport survey plan was required for O/D transport volume survey, transport patterns, sustainability survey and evaluation and DB construction. In 2009, the Phase 1 National Transport Survey Plan (2009~2013) was established, which required a basis for land, sea and air transport policies, and investment projects based on transport demand predictions and economic/political validity evaluations, as well as significantly enhancing the accuracy and utility of that national transport DB that is obliged to be used for transport policies, according to its status, functions and users' requirements.

This national plan provides effective directions on national transport surveys and DB construction for land, sea and air transport sectors on a five-year basis. It is characterized as a superordinate plan on individual transport survey-related plans, such as road transport volume, public transport status, municipal governments, etc. Accordingly, the national transport DB can be characterized as national transport "database" having status and capacity as fundamental data on the establishment, execution, evaluation, etc. of transport plans, policies and projects. It provides transport "information" with reinforced scientific analysis/evaluation capability and data/model/policy-to-policy connections, and national transport "statistics," whose quality and execution system as national statistics is secured, with roles that are well-defined.

1.2.2 Outline and Objective of Plan

The National Transport Survey Plan consists of "Outcome Analysis for National Transport Demand Survey and DB Construction Project," "Objective and Strategies for National Transport Survey Plan," "Sector-by-Sector National Transport Demand Survey and DB Construction Plan, Investment Plan and Directions for Budget Procurement."

The project outcome analysis sector looked back at the two phases of the past 10 years' projects and outcomes, as well as identified problems and improvements. It also suggested new project objectives and strategies by inspecting past outcomes, based on inspected sector-by-sector projects' detailed contents, and recommended plans, such as yearly contents and schedules. It also inspected the budget required for yearly projects and proposed options to secure the budget.

The National Transport Survey Plan specified the following goals with the vision of the "implementation of national transport surveys and analysis system with standards comparable to developed countries." First, survey and analyze national transport demands in land, sea and air sectors comprehensively and regularly, such as O/D transport volume of passengers and freights between regions, transport infrastructure, transport volume delay functions, transport cost and performance, greenhouse gas emissions, etc., to amend/revise the DB. Second, secure the reliability of national transport demand surveys and DB construction results, to a level that the users require, and to which society can agree, e.g. secure the accuracy of O/D transport volume of passengers and freights, with respect to general national roads, to 80% and 70%, respectively, and continuously enhance the precision of network for transport analysis and transport volume delay functions. Finally, expand the range of utilization of the national transport DB, so that recent intermodalism as well as complex connected transport analysis network and policy indices related to sustainable transport policy can be effectively supported.

Strategies to achieve the aforementioned goals are as follows:

First, methods and items for the survey must be reformed to enhance the reliability and utility of the national transport DB. Specify the survey unit (transport zone) in the country

from the city/district/borough classification (249) to the town/township/dong classification (3,500). Switch the main survey method from roadside interviews to household transport status surveys. This can also allow assessment of intra-zone transport volume, which was an important drawback of transport demand predictions at the time. Also, change survey methods involving a large workforce towards transport survey methods that utilize cutting-edge data such as PDA, RFID, pass cards, navigation and ITS data as much as possible. Also utilize population census data to implement and validate the national transport DB. At the same time, survey fundamental data for transport demand prediction steadily and harmoniously, including O/D transport volume, network, transport volume delay functions, etc. and implement them to the DB. Second, extend the fragmentary transport survey/analysis system, based on a single mode to methods relevant to a large-scale complex connection system. Third, promote independence in organizations, human resources and budget systems of private sector institutions, in order to enhance performance appraisal capabilities of legal government business agencies. Also, keep supporting and strengthening the project agents' internal capacity, e. g. fostering continuous participation of academia in research/development of theory and models in regards to the transport survey, analysis and the DB. Finally, make efforts for stable procurement of relevant project budget, so as to conform to the aforementioned objectives and strategies.

1.2.3 Establishment State-of-the-Affair and Future Plans

The Phase 1 National Transport Survey Plan set 2009~2013 as its temporal scope, and the whole country as its spatial scope. The overall items related to the transport survey, analysis, processing, and DB construction/management/utilization of the items regulated by the Integrated Transport System Efficiency Act were established, such as operation status and transport volume in regards to transport infrastructure and transport means in road, aviation, and marine sectors as its contextual scope. The establishment of the National Transport Survey Plan was initiated in September 2007 with review and revision of laws related to its foundation, which went through business consultations with related authorities, circulation to target institutions and final amendment, and was finalized on August 28, 2009 via the deliberation and vote by the National Transport Council.

Starting from 2009, yearly projects have been carried out according to this plan. However, changes were made to the original plan, as the project progressed. The main reason was difficulty with securing an appropriate budget. Therefore, changes were made to project plans within the Phase 1 plan period, which affected the National Transport Survey Plan thereafter.

To reflect these circumstances, the Phase 2 National Transport Survey Plan will be established between 2011 and 2012, and is expected to be more realistic and reasonable than its predecessor, by comparing and reviewing outcomes from the first phase survey, in contrast to the survey plans.

2. Project Promotion System and Procedure

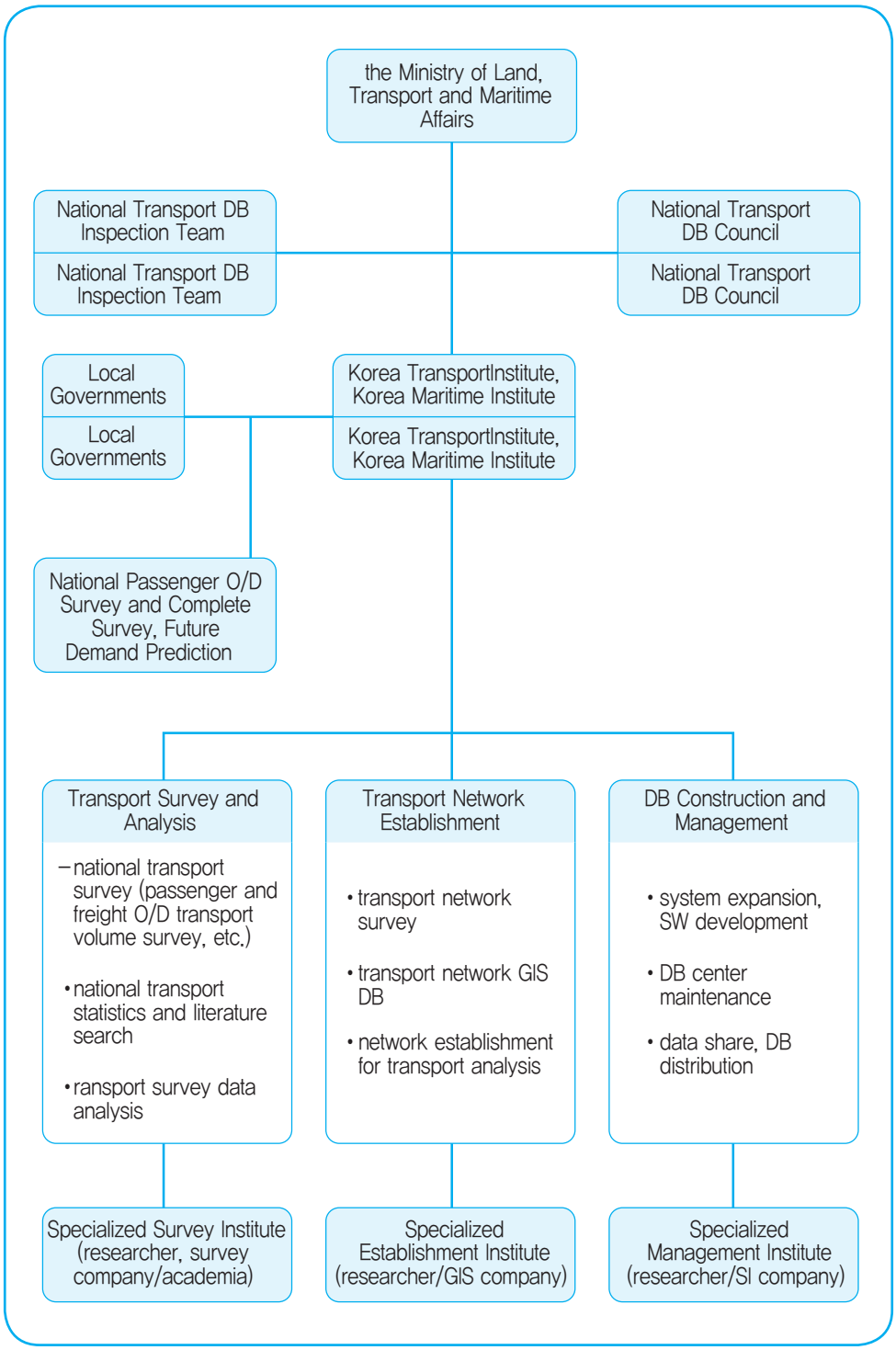
2.1 Project Promotion System

This project is supervised and executed by a central government agency (the Ministry of Land, Transport, and Maritime Affairs), and the Korea Transport Institute, a government-supported research institute, acts as a proxy considering the task specialty and project performance efficiency (Integrated National Transport System Efficiency Act, Article 114). Moreover, these assignments are applicable for the entire country, due to the national transport survey and DB construction's characteristics. It is, therefore, necessary for cooperation between local government bodies. Thus, the three main agents to implement the national transport survey and DB construction project are the Ministry of Land, Transport, and Maritime Affairs representing the central government, the Korea Transport Institute as a non-governmental agency and the local government authority involved.

The Ministry of Land, Transport, and Maritime Affairs establishes medium- and long-term project plans, secures the budget, and manages the National Transport DB Council and the National Transport DB Inspection Team. The local governments, from the individual transport survey plans to final execution, revise and utilize the transport DB through their mutual cooperation with the Ministry of Land, Transport, and Maritime Affairs. During the national transport survey, local government authorities maintain this cooperative system with the central government agency. Agencies (the Korea Transport Institute, the Ministry of Land, Transport, and Maritime Affairs) take charge of executing the project plan and its promotion, make detailed survey plans, analyze survey results, and establish the DB with results for the foundation of cooperative utilization. More detailed roles played by each agency is explained in [III-2. Each agent's roles].

This project's cooperative system among the main agents is as follows [Figure 2-1].

Figure 2-1 | National Transport Survey and DB Construction Project Promotion System



2.2 Implementation Procedure

This project's implementation procedure is roughly divided into preparation, performance and utilization phases.

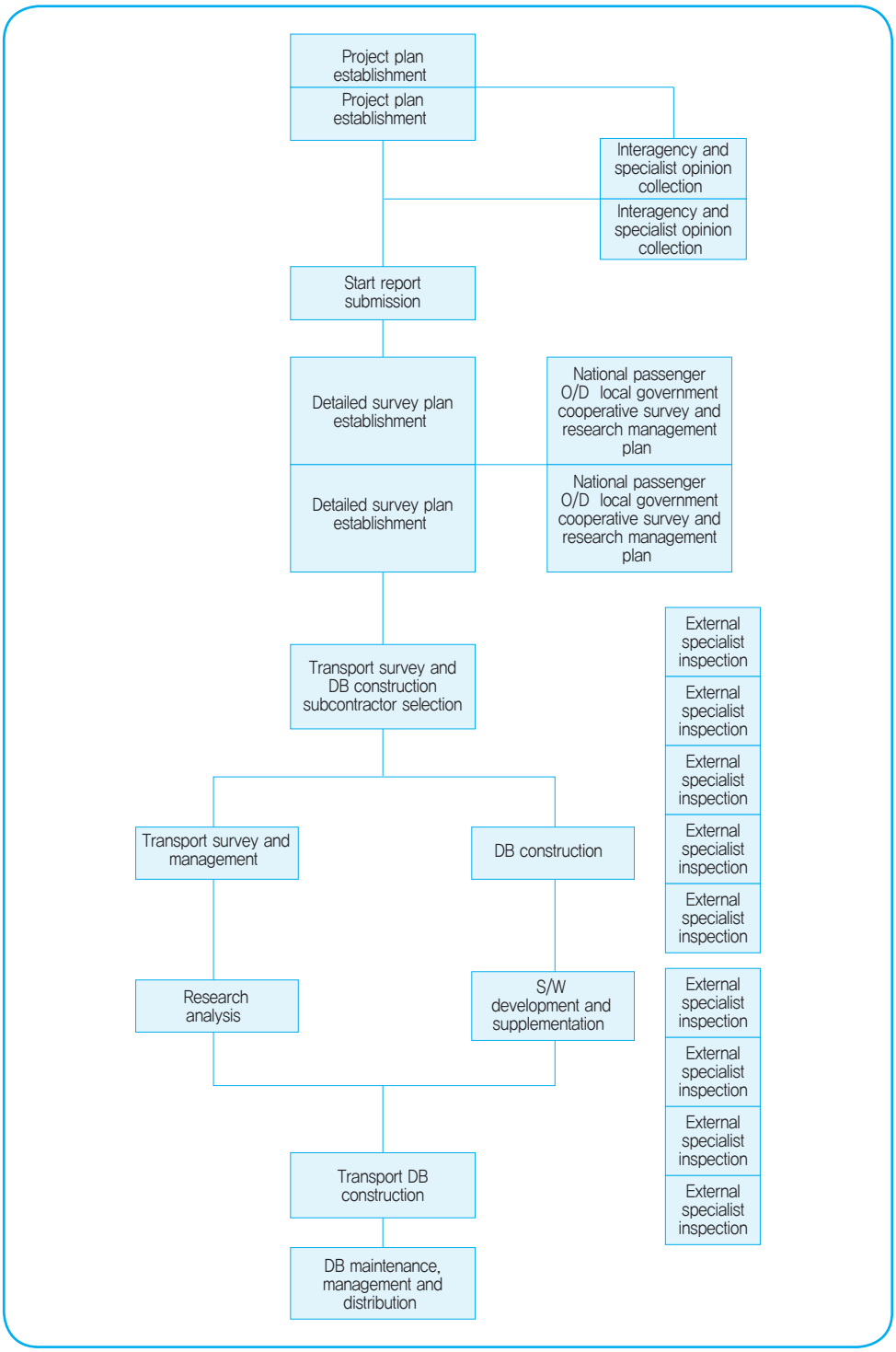
In the project preparation phase, the national transport survey plan is devised as medium- and long-term project implementation planning. Based on this survey plan, yearly project content and scale are decided, and discussion with budget-related government departments is completed to secure the related budget. Once the budget scale has been decided, a project plan is written focusing on its main business, in addition to opinions of a civilian proxy agency, government, interagency, and outside specialist groups (national transport DB inspection group). Results are collected and adjusted so that this yearly project plan is finally completed. According to the settled project plan, the civil proxy agency and the Ministry of Land, Transport and Maritime Affairs make an agreement about project performance, and launch the new business.

In the next phase of project performance, the civil proxy agency submits a start report. At the same time, the proxy agency establishes detailed plans of the transport survey and research analysis year to date. Real survey scale and supply, survey pool and methods are established during this time. According to detailed plans, if necessary, a survey contractor is selected and the duties are assigned. The passenger O/D transport volume survey and analysis study (complete survey, Future Demand Prediction, etc.) have been implemented by matching funds through cooperation between the capital area and the five megalopolis local governments since the 2010 national transport survey. Once a cooperative institute or agency has been decided, a practical transport survey is processed, and the research arm executes the related study, including statistical data collection. In order to make expected transport surveys and research analysis results into the DB, the system field secures space at the server, and supplements and manages the DB system.

When the transport survey and study analysis are completed, the O/D transport volume, transport network, any transport statistics and indicators are made into electronic files and documents. The electronic files are stored into the DB server, and made available to the public through the project website. Publications, including the final report, are distributed to government agencies and interagencies.

This whole implementation process is verified by each field's assigned expert adviser at the external inspection agency, National Transport DB Inspection Team, regulated by the Integrated National Transport System Efficiency Act.

Figure 2-2 | National Transport Survey and DB Construction Project Implementation Process



3. Promotion Agents' Roles

This project is implemented by the Korea Transport Institute, led by the central government (the Ministry of Land, Transport, and Maritime Affairs). According to the project content, cooperation with local governments is obtained. The three promotion agency roles are as follows.

3.1 Central Government: Ministry of Land, Transport, and Maritime Affairs

Project plan establishment and task process management are the main duties of the Ministry of Land, Transport, and Maritime Affairs. In addition to the annual implementation plan of national transport survey and DB construction project, the national transport survey plan as five-year unit and medium- and long-term design is established and managed. The total cost is supported by government funding, so in order to secure the proper project budget, the cooperation with related agencies is essential.

By managing the National Transport DB Council as a legal consulting organization of the central government, local governments and interagencies, there are regular meetings among agencies to perform national transport survey and research analysis efficiently. Moreover, the Ministry of Land, Transport, and Maritime Affairs assigns a national transport DB inspection team consisting of external specialists in transport field academia and industry, and examine substitute agencies' implementation situations over the whole project practices. At the same time, as the ministry supervises the inspection team's management, makes substitute agencies revise and supplement the project content and plan, on the basis of the inspection results. In addition, to secure the objectivity and unity of transport survey, the Ministry writes and notifies transport survey guidelines (the Integrated National Transport System Efficiency Act, Article 15), and executes revisions through prior discussion about a public agency's individual transport surveys (same law, Article 16).

3.2 Municipal Governments

The National Transport Survey was designed to cover all of Korea, and as such, collaboration with municipal governments is essential. Regularly-administered passenger transport status surveys are performed through visits to, and interviews with, individual households. Thus, these kinds of surveys s necessitate the administrative power of municipal governments from each region. Moreover, cooperation with related departments is needed because parts of the transport infrastructure must be occupied whenever necessary. Therefore, municipal governments collaborate with the central government at the level of actual work from the survey planning stage. If a self-limited individual transport survey is performed, the municipal government follows a consultation procedure in advance according to related laws, and it also consults with the Ministry of Land, Transport and Maritime Affairs regarding whether or not the individual transport survey data can be implemented and managed as the national transport DB.

3.3 Substitute Agencies

The National Transport Survey and DB Construction Project is carried out by substitute agencies. In order to improve the specialty and efficiency of duties, the government prepared and implemented a legal basis for the Korea Transport Institute, a government-supported research institute to take on the duties of the transport survey and DB construction. The Korea Transport Institute takes full charge of and substitutes the national transport survey and DB construction duties with the Ministry of Land, Transport, and Maritime Affairs. The substitute agency establishes the detailed implementation plan of annual surveys, and if necessary, chooses a cooperative agency or company and performs cooperative surveys or research. Moreover, the substitute analyzes survey results, conducts separate research, and implements and manages results with the DB. The substitute agency constantly strives to raise the reliability of transport surveys, and implements the revision and hardware or software maintenance to improve the efficiency of the national transport DB construction and management. The agency seeks to implement data supply system improvement plans, to expand the transport DB's cooperative use, and supplements the utilization system by frequently updating user demand analysis. The substitute takes charge of actual work as a member concerning the national transport DB council's management, and should actively help inspection tasks under the direct supervision of the national transport DB inspection team. The substitute agency carries out the drafting and revising of transport survey guidelines as legal guides of transport surveys, and is in charge of project promotion work through all sorts of events and material publications.

2011 Modularization of Korea's Development Experience
Construction and Utilization of National Transport Database

Chapter 3

National Transport Survey and DB Construction Project: Details

1. Project Objectives
2. Project Details
3. Project Value and Utilization

National Transport Survey and DB Construction Project: Details

1. Project Objectives

1.1 Details on Pushing Forward the Project

The DB project started in 1998 as a public employment project, which was part of the government's efforts aimed at economic recovery following the IMF foreign exchange crisis. With the goal of implementing electronic government (E-government) initiatives, it started as the national passenger/freight transport volume survey project in 1998 with a budget of 3.139 billion KRW to procure fundamental transport-related data at the national level. The project was updated in 1999 by conducting the national transport infrastructure survey, the five megalopolis transport survey, transport induction unit requirement survey, etc. through an increased budget of 10.908 billion KRW.

Laws necessary to legally support the execution of the DB project were prepared in February 1999. The Transport System Efficiency Act (currently the Integrated Transport System Efficiency Act) aims at contributing to promote the convenience of people's living and the national economy through a comprehensive adjustment of transport policies, implementation of an efficient transport system and procurement of system efficiency. Especially in regards to this DB project, methods and standards of transport survey were standardized to secure objectivity and consistency on national transport surveys, which was subsequently drawn as guidelines. Also, it was also required that foundation for implementing and utilizing transport survey results into the DB be constructed. Since then, the Transport System Efficiency Act has been revised several times in response to change in social circumstances, which made changes to the contents and scope of the National Transport Survey and DB Construction Project. In addition, Korea Transport Research Institute and Korea Institute of Maritime and Fisheries Technology, private sector organizations, were appointed as acting agencies to conduct this project, thereby securing professionalism and efficiency of survey and analysis. The details will be further explored in the section focusing on Legal Basis.

The first phase of the project was planned for five years, from the initial transport volume survey project initiated in 1998, to the completion of creating the groundwork for a national transport DB in 2002. This paved the way for the current transport DB system, including national passenger/freight O/D transport volume, network for transport analysis and transport statistics, and starting the utilization service through Internet and direct delivery. Later, the second phase of the project was set up as a five-year project from 2003 to 2007, which pursued the expansion of the national transport DB and provision of high-class services, by improving the systems for transport DB collection and aggregation, designing a user-oriented Internet service, expanding and vitalizing transport information distribution, reinforcing utilization analysis in the transport DB, and improving the inter-agency cooperation system on transport surveys and transport data through each annual projects.

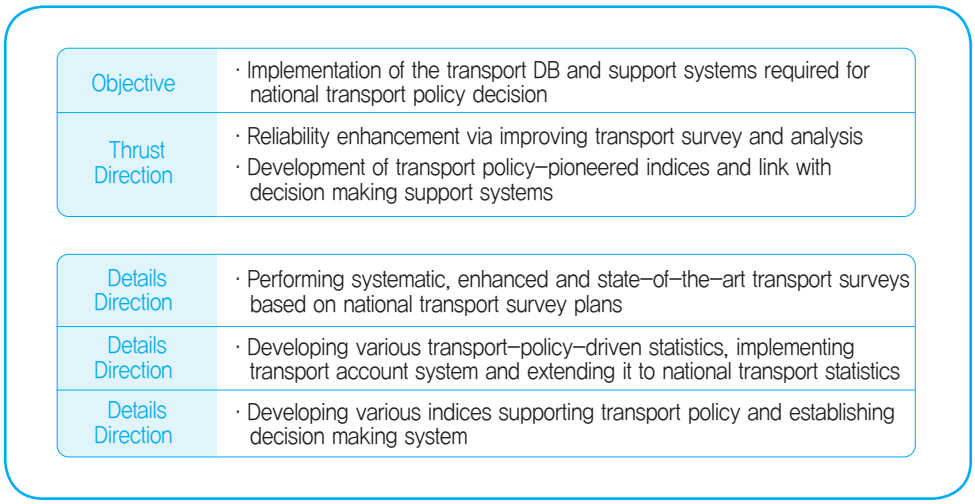
After the completion of the second phase, the National Transport Survey and DB Construction Project hit its stride, being conducted steadily on a yearly basis. The project sought to boost the reliability and utility of the national transport DB, by performing regular national transport survey and related research and analysis, finding measures to improve reliability, collecting users' opinions, and expanding the DB itself.

1.2 Project Objective and Anticipated Effects

1.2.1 Project Objective

The objective of the National Transport Survey and DB Construction Project is to implement the transport DB required for national transport policy decisions its support systems. For this purpose, the project improves the reliability of the transport DB via enhancements in transport survey and analysis, develops transport policy-pioneered indices, and strives to get connected with decision-making support systems.

Figure 3-1 | Objective and Directions of National Transport Survey and DB Construction Project



Major contents of the National Transport Survey and DB Construction Project, enforced based on the Integrated Transport System Efficiency Act, is to conduct national transport surveys and implement them into the DB. This is to promote comprehensive and standardized surveys, analysis and management of fundamental data and statistics required in establishing policy and plans, which is in line with the objective of the Integrated Transport System Efficiency Act. In particular, the objective of this project can be summarized as follows.

First, enhance the reliability of evaluations on various transport infrastructure investment projects, by setting up foundation for implementing standardized and consistent time series of fundamental transport statistics data, which can be utilized often. Fulfill a transport statistics collection system, the quality of which is comparable to foreign developed countries. Prepare a transport DB release that can be utilized not only by the government, but by academia and the general public. Also, prepare internal and external inspection systems to improve the accuracy and reliability of the transport DB, so that the DB produces reasonable results.

Second, implement a system that can systematically survey, analyze and manage a variety of fundamental data in regards to the travel of passengers and freights required to establish a transport plan. Make sure that the O/D transport volumes of passengers and freights, transport records, etc. are data directly related to transport demand analysis, transport infrastructure investment and operation policy. Adopt standardized and scientific calculation and prediction methods for these data. Also, make sure that these data are managed by the government to secure reliability.

Third, research and produce various transport indices that can lead and support national policy, and establish linking systems with national decision-making support systems.

Develop and create various transport indices that can support anticipatory policy proposals and prompt decision-making.

1.2.2 Anticipated Effects

The following effects can be anticipated as a result of the National Transport Survey and DB Construction Project.

In general, the national transport DB can be utilized for a variety of project sectors, by relating it to the purpose of the projects. It can be used as preliminary data for the effective establishment and execution of transport-related policy and plans of the central and municipal governments. It can also be used for various analyses in conducting transport-related research by industry, academia and research institutes. IT can also be utilized via various GIS-T information, statistics data, internet, publications and so forth, thereby enhancing the information accessibility for the general public.

In the transport sector in particular, it is possible to save on project costs for projects such as the national backbone transport network plan, medium-term transport infrastructure investment plan, validity of transport infrastructure projects, various fundamental plans in transport sector, and more. By utilizing the transport DB implemented, it is possible to cut budget requirements for administrative tasks including transport survey and analysis costs, which represented majority of the service costs for individual projects. In addition, it becomes possible to establish effective transport policy and plans for the reduction of transport congestion and national distribution fees, by enhancing the reliability through the standardization of transport survey techniques and tables.

2. Project Details

The National Transport Survey and DB Construction Project is executed by being split into sectors, including passenger survey and analysis, freight survey and analysis, transport network survey and implementation, national transport statistics implementation, DB system management and operation, and project management. Major detailed projects in each sector are summarized in the following table.

Table 3-1 | Major Detailed Projects in Each Sector

Sector	Major Detailed Projects	Comment
Passenger Demand Survey and Analysis	National passenger O/D transport volume survey, complete survey of national passenger O/D and prediction of future demands, supplementation and renewal of national passenger O/D, road traffic cost function research, etc.	Sea included

Sector	Major Detailed Projects	Comment
Freight Demand Survey and Analysis	National freight O/D transport survey, complete survey of national freight O/D and prediction of future demands, supplementation and renewal of national freight O/D, distribution network implementation, etc.	Sea included
National Transport Network Implementation and Analysis	Transport network survey, implementation of transport network GIS DB, network implementation and analysis for transport analysis	
National Transport Statistics Survey and Analysis	Transport induction unit requirement survey, national transport statistics survey, survey of transport outcome and division rate, transport cost and greenhouse gas emission survey and DB construction, special transport status survey	
DB System Implementation and Management	DB system implementation and management, improvement of DB management system and homepage	
Project Management and Operation	DB project management, project promotion, operation of national transport DB council, support in operation of national transport DB inspection team	

2.1 Passenger Sector Survey and Research

1.2.1 Basic Directions

The passenger sector aims at expanding the transport survey and DB to be implemented, in order to cope with increased reliability and basic demand of the users, including the government. It diversifies passenger O/D survey methodology, standardizes demand prediction and validation methods, and steadily improves network and transport volume delay functions for transport analysis. It also enhances the reliability of the passenger DB by actively performing a series of feedback, in which problems associated with projects are accepted and improved via experts experienced in demand analysis and/or validity evaluation on transport infrastructure development projects. In addition, the sector surveys items required in the Integrated Transport System Efficiency Act and the Distribution Policy Basic Act, and others, while performing adjustments on passenger transport survey and DB domain, e. g. adjusting transport survey items by carrying out requirement analysis (demand survey) on persons in charge of transport policy and analysis. Finally, introducing and utilizing user satisfaction as an index for the degree of improvement in the reliability of the passenger transport DB has been considered. It advances and systematizes survey and analysis to enhance the reliability of the passenger transport DB, such as changing from a roadside interview survey to a household transport survey, the introduction of state-of-the-art survey techniques and the use of state-of-the-art survey data, zone specification, and transport volume delay function analysis.

1.2.2 Transport Survey

The surveys conducted in the passenger sector include the "Preliminary Survey on National Passenger Transport Status," the" National Passenger Transport Status Survey," the "Transport Volume Delay Function Survey," and the "Transport Panel Survey."

The Preliminary Survey on Passenger Transport Status is a preliminary survey, conducted before the main survey, which aims at error prevention. It establishes the methodology on the selection of survey targets, locations, etc., designs respective survey tables for inter-/intra-region and traffic-related transport status surveys of target households, transport volume surveys, passenger transport infrastructure status surveys and more. It also establishes the appropriate survey methodology and detailed plans for the main survey, and produces the survey manual.

Followed by the preliminary survey, the National Passenger Transport Status Survey conducts surveys on passenger transport for classified sectors. First, it conducts the Household Transport Status Survey to understand household characteristics, O/D, aim of transport, transport means, departing times, transport time, and more. It also performs the Transport Volume Survey, using imaging equipment in diverge/merge sections of 249 city/district/borough units, in order to validate transport volume after implementing the DB. Moreover, it carries out the Public Transport Infrastructure Use Status Survey, which analyzes departure and arrival points, in addition to means of access for airport, harbor, railway station and bus terminal users, in order to construct O/D of public transportation users. It also performs the Average In-Car Head Count Survey to understand the number of transport users, such as passenger cars, buses, and taxis at important city/district/borough-level locations. This is done in order to construct parameters to convert objective O/D to method O/D.

The Transport Volume Delay Function Survey selects optimal survey locations by type of transport cost functions, to establish road hierarchy by regions and select proper survey locations by hierarchy. This allows the survey to carry out a national survey on fundamental data such as road hierarchy, crossroads, capacity, transport volume, etc. It includes road condition surveys on representative locations by road hierarchy, transport status survey, etc. The aim is to implement the VDF that can most realistically reflect real roads and transport conditions.

Lastly, the Transport Panel Survey is a survey for enhancing reliability of demand prediction and analyzing the effects of transport policy. It is a periodic survey targeting approximately 3,000 households residing in large major cities, in order to survey the number of transport, transport locations, transport cost, etc. in order to deduce related transport indices.

1.2.3 Research Sector

In the passenger sector, research and analysis focuses on passenger O/D transport volume by using fundamental data, various literature data and state-of-the-art fundamental transport data collected through transport surveys.

First focus is on the amendment and renewal of passenger O/D transport volume, which is fundamental to establish, execute and evaluate transport plans and infrastructure investment plans, including the National Backbone Transport Network Plan. Every year, current and future estimates of passenger transport volume are calculated, considering changes in social-economic indices and transport infrastructure investment. Also conducted are classifications of transport volume according to transport objective and means, analysis of division rate by means, transport characteristics analysis, research on improving reliability for regular transport survey, time series analysis, etc.

In addition, there is research on implementing the O/D transport volume, by using various transport information data arising from the operation of state-of-the-art transport systems. This research sheds light on cutting-edge transport information, such as pass cards, TCS data, etc., amends passenger O/D transport volume and validates its reliability by reviewing domestic and international research cases on utilization options, identifies cutting-edge transport information that can be utilized, and develops methodology.

2.2 Freight Sector Survey and Research

2.2.1 Basic Directions

The objective is to carry out survey and analysis reflecting domestic and international status changes in distribution sector, secure reliability of the freight DB, and to implement and manage freight transport status data, which can play a central role in domestic freight analysis, with the aim of enhancing its utility for establishing domestic distribution policy. To achieve this objective, regular and non-scheduled freight surveys, distribution route analysis, improvement of freight demand estimation methodology, etc. are carried out. Also, a non-scheduled survey is performed to implement detailed data, which can be used for analyzing specific freight, in addition to the regularly conducted large-scale business surveys. Moreover, surveys are conducted that can reflect the total quantity of goods transported without the net quantity of goods transported. Furthermore, an optimal freight demand analysis methodology is reviewed, for which additional data surveys and implementation of collaboration systems for freight O/D surveys are set up as strategies. Various surveys and research are also being conducted.

2.2.2 Survey Sector

Survey related to freight is being conducted in eight main categories.

First, along with the passenger sector, the National Pre-Survey on Freight O/D between Regions for seamless freight main survey establishes methodology for a selection of survey targets and locations, as well as designs of survey tables by survey type and methodology. It also establishes a detailed plan on main surveys and creates a survey manual. Also, it surveys freight concentration points, such as newly opening harbors, distribution centers, etc. in advance, thereby creating a basis to perform an efficient main survey.

Second, it performs the Freight O/D Transport Volume Survey to implement comprehensive the DB related to freight transport, in order to survey the transport pattern of freight in the country and apply it to the transport policy and project analysis. This survey includes the distribution infrastructure status survey, unit requirement survey, sea freight O/D survey, and the coastal freight O/D survey. The distribution infrastructure status survey reviews the status and operation characteristics of distribution infrastructure. The distribution infrastructure unit requirement analysis surveys unit requirements (freight's volume of business per employee, land area and floor area) dealing with freight at major distribution centers. It also conducts a sea freight O/D survey against trade ports, ICD, ODCY, etc. to understand freight O/D, transport path, transport time, freight items, etc., and the coastal freight O/D survey to understand the freight O/D, transport path, transport time, freight items, etc. between coastal harbors, between coastal harbors and trade ports, and between coastal harbors and inland areas.

Third, a freight vehicle pass reality survey and a freight genesis middle base survey are performed with "freight vehicle's run reality," which aims to comprehend characteristics of freight vehicles, forming an absolute part of domestic freight transport. Also, freight vehicle run features' seasonal change, weekly change, etc. are inspected at most distribution centers.

Fourth, the distribution channel survey of freight by item aims to perceive freight flow from the view of enterprises on the travel route information of freight by item. In this survey, major trade freight or domestic freight having a significant effect on national economy are changed in the manufacture and processing process, from domestically to internationally. The survey is inspecting the whole freight flow of use channel, from the place of origin to the end-consumer.

Fifth, the freight unit requirement survey analyzes freight relay features through routine freights' unit requirement renewal and improves the reliability of freight and freight vehicle demand estimates. Also, it researches freight pass occurrence and arrival unit requirements about distribution base facilities, such as freight terminals, airport terminals, wholesale and retail markets, train stations, etc.

Sixth, for transport accidents involving hazardous materials such as flammable or radiation freight, the hazardous materials transport system survey for special management to minimize widespread damage establishes basic data by virtue of studying transport routes and methods of hazardous materials, such as petrochemicals, industrial gas products, nuclear fuel, chemicals.

Seventh, by actively utilizing basic data for mode choice analysis in freight, the freight expense survey is applied toward the analysis of freight ways and effects through complex ways during the SOC project analysis. This survey also focuses on more microscopic and detailed expenses for each means' freight transport, for each means' quantification of O/D door to door expense, and item definition of expense data. Each item's expense computation plan are established and the survey is then implemented.

Finally, the port congestion reality and expense survey secures the detailed basic data regarding transshipment containers' flow. Port congestion reality and expense are also surveyed, and the transshipment's international transport network is researched as well.

2.2.3 Research Sector

The following research and analysis are made using fundamental data collected from various freight surveys.

First is the "Freight O/D amendment and renewal," used to secure timeliness by renewing national freight O/D data between regions on a year to date basis. Statistics related to transport and social economic indices are reflected to renew freight O/D between regions for the base year, in addition to future years, and the truck O/D is deduced and implemented to the DB, so that it can be linked to passenger O/D by car. Furthermore, freight transport by freight tons and by items, as well as the transport status, are also analyzed.

Second, the "Freight Panel Survey and Analysis," which is used to enhance the reliability of freight transport behavior/freight demand prediction analysis and to perform an analysis on the effect of freight and transport policies, surveys the quantity of goods transported, truck transport status, freight cost, etc., thereby deducing related transport indices by making regular annual surveys over approximately 1,500 representative companies.

Third, the "Freight Demand Analysis Guidelines Research" seeks a possible analysis structure from the current data system, and makes guidelines for a freight demand analysis between regions, including a systematic freight demand analysis and the implementation methodology, considering freight characteristics under the background of establishing an index system required for an ideal future freight analysis. It also develops freight a demand validation methodology and provides measures of implementing survey data. In addition, it develops urban freight transport demand analysis models, and collects necessary data for this purpose, thereby reviewing the results of model applications via case analysis.

Fourth, the "State-of-the-Art Survey Data Collection and Utilization Research" is conducted to seek a variety of options to construct dynamic freight O/D transport volume data, together with the use of real-time cutting-edge survey data for the future. The type of transport-related cutting-edge survey data are then determined, status in regards to the utilization of cutting-edge techniques are understood, and collections options for utilization methods of cutting-edge survey data are studied.

2.3 Survey and Research in Transport Statistics Sector

2.3.1 Basic Directions

The transport statistics sector collects transport statistics and literature from individual statistics production agents and implements them into the DB, providing users with

convenience and calculating reliable transport outcomes and division rates through transport survey data, including cars. It also collects and organizes important transport statistics and literature data from a variety of sectors, newly constructs and adjusts statistical data to cope with changes in user requirements, and promotes the production of processed statistics and its DB construction using survey data. Through these activities, it aims to become the hub for transport statistics and literature data. Also, it enhances efficiency, accuracy and convenience for the use of statistics and literature data.

2.3.2 Survey and Research Sector

In the statistics sector, the following data survey and DB construction are conducted.

First, problems were raised on the lowered utility of data and inefficiency in its use, due to a lack of information on data location, implementation details, and the possibility of procurement and its procedure. This was caused by the lack of computerization and systematic management in the production of statistics for domestic statistics and literature. This project sector aims at improving this problem. It maintains the timeliness of data through continuous renewal and implementation of many transport statistics and literature data, and implements additional new items by coping with changes in transport data requirements. Further, it expands utilization support via processing and analysis of collected data, as well as connecting data between related agencies.

Second, transport records and transport division rates by transport means and region is utilized as the most important data for reference. However, transport records provided by the statistics chronology does not include cars, and has many limitations in regards to fidelity. To improve the timeliness and fidelity of transport records and division rates, the "Transport Record and Transport Division Rate Survey" has been introduced. This survey defines requirements for transport records and transport division rates data, reviews survey and the analysis system of major developed countries for data related to transport record. It also establishes computation methodology for domestic transport-related data, and calculates transport performance data through transport record and transport division rate surveys.

Third is the transport cost survey, a detailed project aiming to unify cost items, calculation methodology amendments, calculation reference year and the tie of announcement. This is to enhance their degree of utility in policy, and to provide standardized information on the transport sector's social total cost and revenue, including all transport means. Currently, the external transport cost calculated individually in the Korea Transport Research Institute is adjusted from total transport cost's perspective, and all costs related to transport are surveyed and analyzed.

Fourth, the "Transport Sector Greenhouse Gas Emission Survey" is conducted to set up a basis to utilize systematic and comprehensive statistics calculation methodology, and affect evaluation of transport policy in regards to environmentally-friendly modes of transport.

Fifth, the "Transport Induction Unit Requirement Survey," which aims to understand transport volume and characteristics of passengers and cars to calculate transport induction unit requirements, studies the transport induction volume that serves as fundamental data required to carry out the prediction of transport induction volume. This is then used to form transport policy, city planning and development, transport effect evaluation, transport induction allotment system, etc.

Finally, the "Special Transport Status Survey," aims to support the establishment of efficient transport policy by predicting transport demands during special holiday periods, such as summer vacation and holidays. It also performs pre-questionnaire surveys before the New Year's Holiday, summer vacation period, and Thanksgiving Holiday every year, thereby estimating transport plans and characteristics of citizens, to support the government in setting up special transport measures.

2.4 Transport Network Sector Survey and Research

2.4.1 Basic Directions

The transport network survey and analysis is a basic electronic map of the transport sector from transport infrastructure surveys, and includes roads and railways. It aims to implement fundamental data that can be utilized in a variety of areas, such as public informatization projects. Under this objective, its strategy is to construct fundamental data and implement the DB with a diversified layer system to expand the transport infrastructure survey scope and analyze complex transport networks, including public transportation.

2.4.2 Survey Sector

The transport network sector performs field surveys on transport infrastructure, including roads and railways, to implement a transport electronic map and network for transport analysis. Over the whole country, it acquires fundamental data on newly constructed and modified infrastructure, and then collects characteristic information on relevant infrastructure through field surveys. The infrastructure primarily concerned at the moment is roads and railways. In case of roads in particular, the survey targets those over the country that are capable of more than two-lane car traffic.

The transport infrastructure survey is being conducted out of necessity for more detailed and expanded transport infrastructure surveys, due to the steady increase in the use of the acquired data to implement transport maps and network for transport analysis. It understands spatial locations and characteristics of transport infrastructure such as roads, and performs renewal of pre-built infrastructure DB, and new survey of newly constructed and modified transport infrastructure.

2.4.3 Research Sector

The project implements a transport electronic map by utilizing transport infrastructure survey data and continuously renewing the network for transport analysis.

First, the transport thematic map is directly connected to transport infrastructure surveys. Implemented into the electronic map is characteristic information acquired for major transport infrastructure, such as roads and railways. This map complies with the standardized electronic map format, and can be utilized in various areas.

Second, sector implements simplified electronic maps that contain elementary characteristics required for transport demand analysis, based on the transport thematic map. Literature data were mostly used to implement network in the initial stage of the project, but its accuracy was significantly improved as transport thematic maps became precise, which was subsequently converted to network and used. The thematic map has been available only for the present year. However, the network for transport analysis is constructed for the next 30 years, by referring to various national transport plans since it is utilized in transport investment evaluations. In particular, with a surge of interest in the national distribution sector, the freight sector implements a distribution network for national/metropolitan distribution infrastructure and infrastructure, dealing with freights such as airports, harbors and train stations.

2.5 DB System Implementation and Operation Sector

The system sector is not directly related to transport surveys or research/analysis. However, it is responsible for implementing and managing the transport DB, using their results.

First, it implements and manages the homepage of the National Transport Survey and DB Construction Project. It performs DB design, data conversion and DB construction of transport survey analysis data, including the passenger/freight O/D transport volume, and provides DB service via the Internet. It also implements the statistics data DB, provides additional service on new items, and provides electronic book conversion and services for existing and newly implemented literature data. It also deducts/reflects items requiring revision and amendment, in regards to the national transport DB homepage and management system, and performs improvements of the homepage for stable data supply service. Furthermore, it continuously develops and implements statistics data display services, using transport thematic map such as transport data and geographic information.

Second, it performs system maintenance and management for stable national transport DB supply services, such as the stable operation of the national transport DB system, reinforcement of web and server security, hardware monitoring, security management, network management, data backup, etc.

Third, it develops a management system for various surveys in general, from the preparation stage to post-survey data arrangement, and develops and manages the transport survey support system, which is capable of survey personnel commitment plan and management.

2.6 Project Operation and Management Sector

The project operation and management sector is responsible for providing support to efficiently conduct the National Transport Survey and DB Construction Project.

Its main tasks are project promotion and foreign cooperation. It conducts hosting and participating in external events that can promote the national transport DB, and pushes forward planning of related events to broaden the utilization of the national transport DB via various workshops and outcome presentations.

Second, it operates the National Transport DB Council. The National Transport DB Council was organized based on the Integrated Transport System Efficiency Act, and implements regular, as well as unscheduled, consultations with related institutions. Its main agenda aims at the adjustment of individual transport surveys, cooperation on analysis and DB construction of survey outcomes. It also opens and manages regular cooperation channels to seamlessly carry out regular and unscheduled national transport surveys.

Third, it organizes and operates the National Transport DB Inspection Team. It organizes a committee with external experts on each sectors of the project, with the aim of enhancing reliability of the National Transport Survey and DB Construction Project, and continuously inspects/submits reviewed opinions in regards to the entire course of the project, from planning through progression status.

3. Project Value and Utilization

3.1 Project Outcomes

3.1.1 Outcomes

Currently, the national transport demand survey and DB construction project have been fulfilled, focusing on the five-year national transport annual surveys. Through the five-year project from 1998 to 2002 (First Stage), the foundation of the national transport DB was created, and the basic DB provision services began.

Since then, from 2003 to 2007 as the second stage, the project propelled the national transport DB expansion and improvements in DB collection and accumulation. It also improved user centered Internet service plans, transport information distribution's expansion and vitalization, transport DB use analysis reinforcement, and related agencies' cooperative system improvement considering transport survey and transport data.

Presently, the national transport demand survey and DB construction project is progressing in a satisfactory manner. And through the national transport survey's routine performance and related survey data's detailed analysis and research, it has been implemented as a continuous project for the purpose of improving reliability and usefulness.

Annual main projects' outcome achievements are as follows.

Table 3-2 | Yearly Outcomes of Main Projects (1998~2010)

	Main Project Outcomes	Note
1998 (3.2B won)	- Passenger and freight transport survey implement of a public work service as a countermeasure against unemployment during IMF (2,733 places over the nation etc.)	
1999 (10.9B won)	- transport survey: transport facilities (14,028 partitions), passenger (238,853 households) and freight (7,531 vehicles) pass reality, public transport use reality (729 bus routes), transport induction unit requirement survey (871 buildings), etc. - survey analysis and research: basic and detailed analysis implementation while utilizing survey results - transport thematic map and analyzing network preparation, DB system maintenance and management, etc.	
2000 (7B won)	- transport survey: transport statistics (190 items) and transport facilities (14,028 partitions), public transport (733 bus routes) use reality, transport induction unit requirement survey (543 buildings), major area transport (291 places), etc. - survey analysis and research: 5 megalopolis passenger and freight transport volume analysis, etc. - transport thematic map and analyzing network preparation, DB system maintenance and management, etc.	
2001 (7B won)	- transport survey: passenger (161,251 households near 5 megalopolis) and freight (10,884 companies) pass reality, transport induction unit (small- and medium-sized base cities, 355 buildings), and marine passenger and freight (28 ports, 31 coast terminals), etc. - survey analysis and research: passenger and freight transport volume and capital area unit requirement analysis, etc. - transport thematic map and analyzing network preparation, DB system maintenance and management, etc.	
2002 (3.8B won)	- transport survey: facility survey (capital area and 5 megalopolis 2,056 partitions' renewal survey, new city 2,550 partitions' attribute survey, new road 1,543 km sector survey), transport statistics and literature research (statistics, international literature 6,800 items, etc.) - survey analysis and research: passenger and freight O/D supplementation and renewal and unit requirement analysis, etc. - transport thematic map and analyzing network preparation, DB system maintenance and management, etc.	

	Main Project Outcomes	Note
2003 (4B won)	- transport survey: facility survey (except capital area and 5 megalopolis, at the nation level 14,092 partitions, new city 1,606 partitions' attribute survey, new road 700 km sector survey), transport statistics and literature research (6,800 items, etc.) - survey analysis and research: between regions, passenger and freight O/D supplementation and renewal and unit requirement analysis as the current, household travel survey results' detailed analysis of capital area and megalopolis, marine freight's transport volume and travel pattern analysis, etc. - transport thematic map and transport analysis' network supplementation and renewal - DB system S/W and H/W expansion and application system development	
2004 (3.5B won)	- transport survey: transport facility survey (16,620 partitions' supplement and renewal, 3,421 partitions' new survey), transport statistics and literature research (statistics : 7 classifications and 289 items, literature : 5 classifications and 10,000 items, etc.), vehicle speed survey (local 5 metropolitan areas), passenger and freight O/D preliminary survey - survey analysis and research: passenger and freight travel between regions in the nation and metropolitan areas as the current, travel features analysis during special holidays, analysis of marine transport network in Northeast Asia, survey system establishment research for O/D data's reliability improvement, etc. - transport thematic map and transport analyzing network supplementation and renewal (reflection of new survey supply in thematic map, and transport analyzing network preparation on 2003 basis - DB system S/W and H/W maintenance and management, application system development, etc.	
2005 (6.5B won)	- transport survey: including Jeju-do, national passenger and freight travel reality and distribution condition survey implementation - transport statistics and literature research (307 statistical items, 16,000 literature items, reference supply form improvement), transport facility survey (new NGIS 3,768 partitions survey and new change road survey, survey manual improvement)	

	Main Project Outcomes	Note
2005 (6.5B won)	- passenger and freight O/D data between regions in the nation and metropolitan areas as the current (on 2004 basis), survey analysis method research for O/D data reliability improvement, marine trade freight transport network survey and analysis - transport thematic map and transport analyzing network supplementation and renewal (facility survey results-reflected thematic map and network renewal, national network renewal and future network construction on 2004 basis, public transport route construction) - DB system maintenance and management, and website reorganization and online analysis function, DB reconstruction - national transport DB council organization and management start	
2006 (6.7B won)	- transport survey: each metropolitan area's passenger travel survey implementation (survey: 55 city and county, 142,000 households, transport volume and the number of people survey for the second time : 3,089 places) - transport statistics and literature research (310 statistical items, 18,500 literature items, etc.), transport facility survey (new NGIS partitions and 76,938 km renewal, permanent survey system construction) - through national transport survey results' detailed analysis and waiting method in 2005, passenger and freight O/D data between regions in the nation as the current (on 2005 basis, 248 zones), marine trade freight transport network survey and analysis - transport thematic map and transport analyzing network supplementation and renewal (facility survey results-reflected thematic map and network renewal, national network renewal and future network construction on 2005 basis, permanent survey system equipment) - DB system maintenance and management, and national transport DB construction project website reorganization and management system development, application S/W function improvement - national transport DB council management and national transport DB construction project informatization strategy plan (ISP) establishment	

3.1.2 Transport DB Construction Situations

As national transport survey and DB construction projects have been constantly implemented since 1998, all kinds of transport DB of major surveys are accumulated and constructed. In the beginning, in accordance with conditions at the time, it was collected and constructed focusing on the necessary DB for transport demand analysis, such as transport investment evaluations. And since demand for transport DB has changed according to changing domestic and international circumstances, the national transport DB's construction content and range have been extended as well. In particular, due to the amendment of Integrated National Transport System Efficiency Act in November 2008, the national transport and DB construction range have been greatly changed. Since then, the project has been implemented as embracing related surveys and all DB items.

Table 3-3 | National Transport Survey and Related DB Construction Situations

Survey/Field	DB Construction Content
National passenger O/D transport volume survey	- each way's and purpose's passenger O/D transport volume in current year - each way's and purpose's passenger O/D transport volume prediction for 30 years in future - respondents' basic data such as O/D, travel purpose, and travel method
Transport volume survey	- every city and county's visible diverge and merge areas' transport volume - major main roads's individual transport volume
National freight O/D transport volume survey	- freight O/D transport volume per item, ton, and method in current year - freight O/D transport volume prediction per item, ton, and method in future year - basic survey data · current distribution data of business: general current status of business, freight vehicle use situation, the quantity of goods transported for the past 1 month, survey data of the quantity of goods transported for 3 days · freight vehicle travel situation data: freight vehicle features, travel features · freight occurrence's transit base situation: diverge and merge area situation per business, vehicle type and facility · freight vehicle situation on the industrial complex's neighboring roads: freight vehicle's transport volume and transport reality data per vehicle type and time

Survey/Field	DB Construction Content
Freight unit requirement survey according to the distribution base	- living-in company situation of distribution base facilities: survey over general company situation, the quantity situation of goods transported, and connection situation - freight vehicle transport volume and spread reality of distribution base facility's entry and exit
Freight circulation route survey	- case data using container's intermodal on circulation route - railway and freight vehicle's transport conduct data considering freight transport
Transport network	- level 2 new and changed road, railroad network thematic map · road junction (crossway title, crossway type) · road center-line (road class, road title, speed limit, number of lanes, one-way road existence, drive way existence, bus lane existence, etc.) · spin limit (spin limit type, etc.) · railroad intersecting point (train station title, train station type, etc.) · railroad center-line (route title, route type, etc.) - airport, port, passenger and freight terminal related transport thematic map · facility location and behind link road, railroad network - transport analyzing network · transport analyzing network including basic attributes toward road, railroad (current and future 30 year object)
Transportation cost survey	- transport congestion expense, traffic accident expense, transportation environment expense, etc.
Greenhouse gas emission survey	- greenhouse gas emission by regions and methods
Special transport measure data survey	- special transport measure period travel behavior survey · special transport measure period preliminary survey : survey 20-30 days before special transport measure period · special transport measure period simple enumeration : survey 10 days before special transport measure period · special transport measure period post enumeration : survey within 10 days after special transport measure period (addendum in 2009 project) · special transport measure period demand estimation and countermeasure preparation - special transport measure period survey results DB · transport record data (monthly, special transport measure period) · survey result table (special transport measure period) · demand prediction result (special transport measure period)

Survey/Field	DB Construction Content
Transport statistics and literature research	- total statistics such as passenger and freight transport record, accident data, transport industry service index - road, railway extension and current route status, port and airport's current facility status and processing power, vehicle registration number, etc. - transport economy expense such as congestion expense, distribution cost, accident cost, pollutant expense, and transport sector government economy expense, and energy consumption, air pollutant material emission, etc. - international transport sector statistics
Unit requirement survey	- personnel induction unit requirement, vehicle induction unit requirement - current general facility status and current transport status - time-based transport induction features
Others	- transport survey guidelines, transport trend information, annual final report, all sorts of specialist workshops and seminar result data, etc.

3.2 National Transport DB Utilization

The national transport DB is used as fundamental data for the effective establishment and execution of transport policy and plans by central institutions and local governments. It started external service for public utilization in April 2001, and it is used as a variety of analysis data for industry and academia, as well as government. Its geographic information and transport statistics data are also accessible by general citizens via the Internet.

The transport DB was used in two ways in the past: online provision through the Internet and detailed analysis data direct provision. However, in order to reduce civil complaints due to the complex application procedures and acceptance process for detailed analysis data, the data provision system (2009 project) is currently improved and managed on the project website. Moreover, each sector's DB of implemented project results, such as transport statistics and literature data, is presented through the website, and online basic analysis function is available for user convenience.

The national transport DB's largest demand is the evaluation field, considering the transport facility investment plan. The national transport DB is utilized in a lot of transport facility investment evaluations and validity analyses, and is extending its application in various fields. It presents extensive use fields, such as the public transport management plan, accident management system, wildlife animal habitat space establishing study, and much more.

3.2.1 Comprehensive Government Plan such as National Mainstay Transport Network Plan

As the transport DB construction project is entrenched in the law, the Integrated National Transport System Efficiency Act, Article 4 establishes a national mainstay transport network plan. The National Mainstay Plan is the government's 20-year plan, which provides an efficient direction for implementing an integrated transport system, including road, sea, and air transport. This is the highest-priority plan for the Korean government for transport infrastructure, and and dictates investment plans by sector and region.

This plan was first established in 1999, together with the Transport DB Construction Project, A revised plan was established in 2007. The national transport DB was utilized to set up scenarios of various 20-year investment plans and produce the optimum method for execution.

As another comprehensive government plan, the national transport DB is used in plans, such as national railroad network construction plan, road regeneration basic plan, the third port basic plan, and the fourth airport development mid and long-term plan.

3.2.2 Individual Transport Facility Investment Evaluation

The government establishes investment evaluation guidelines for an objective investment analysis and evaluation, considering the public transport facility's foundation, extension or redevelopment project (Integrated National Transport System Efficiency Act, Article 18). In case of evaluation, it is stated that the public transport institute utilize the national transport DB when establishing transport-related policy and plan; in case of preliminary validity survey performance, it is equally applied (same law, Article 17).

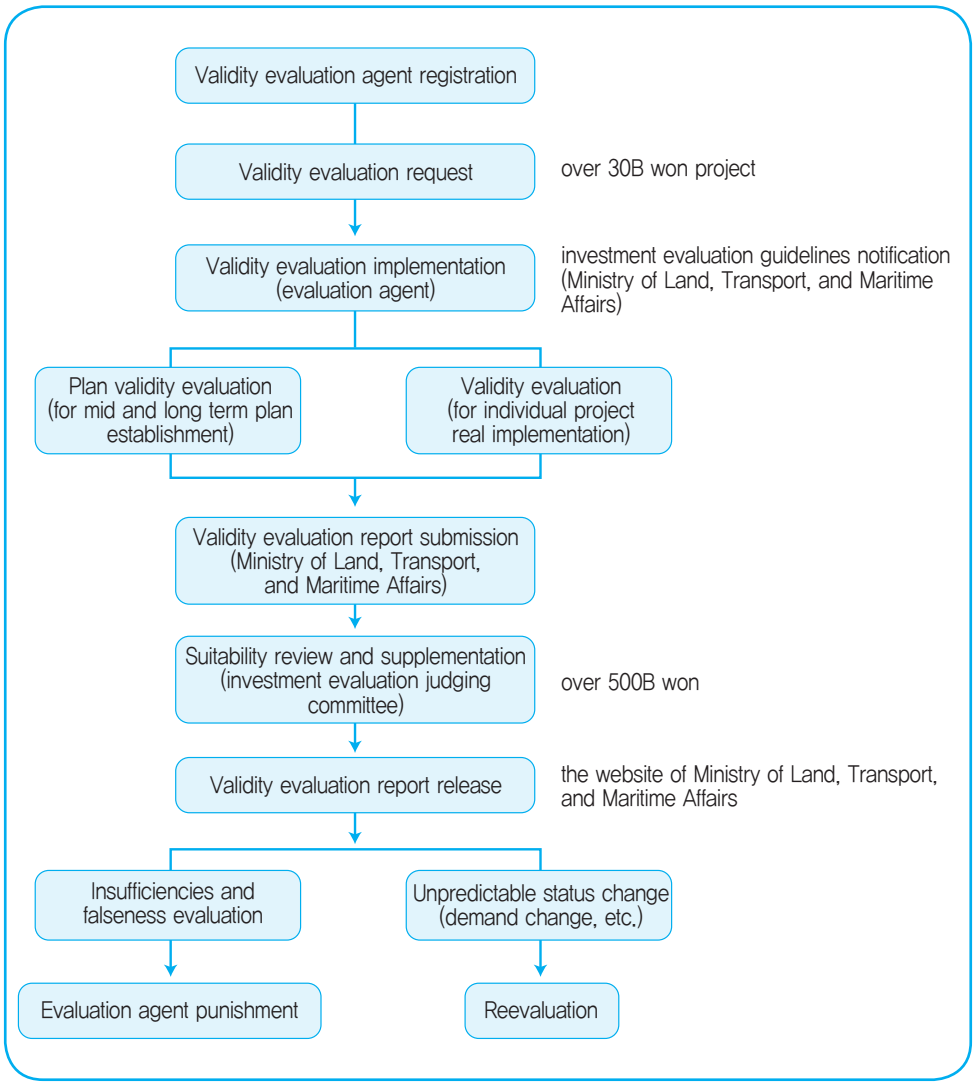
Table 3-4 | Comparison of Transport Facility Investment Evaluation System and Preliminary Validity

Classification	Transport Facility Investment Evaluation System	Preliminary Validity Survey System
Department in charge	- Ministry of Land, Transport, and Maritime Affairs	- Ministry of Strategy and Finance
Based law	- Integrated National Transport System Efficiency Act	- National Finance Law
Purpose	- national transport policy achievement such as national transport system's efficient construction - transport facility investment efficiency such as investment priority adjustment	- finance management such as efficient budget compilation

Classification	Transport Facility Investment Evaluation System	Preliminary Validity Survey System
Application time	- mid and long term plan establishment stage - this validity evaluation stage	- budget compilation stage
Evaluation target	- over 30B won investment project	- over 50B won investment project
Analysis level	- synthetic and specialized detailed analysis using a transport plan model	- preliminary validity analysis
Transport demand analysis	- national transport DB utilization	- national transport DB utilization
Evaluation Method	- single business: focusing on economical validity evaluation but including policy validity evaluation - various businesses within a vehicle and between vehicles: investment priority integrated assessment · economy, local economy ripple effect, transport network effect, etc.	- single business: economical validity, policy validity evaluation (AHP method) - various businesses within a vehicle and between vehicles: not implemented yet
Evaluation agency	- evaluation task agent · one with specialists (engineering company, transport research institute)	- Korea Development Institute (KDI)

The following shows the investment evaluation's task flow, considering the transport facility development project. At the validity evaluation stage, through the analysis based on the national transport DB, the evaluation is completed. After the evaluation, if the project is deemed valid, private investment possibility is reviewed by adding finance evaluation.

Figure 3-2 | Flowchart of Transport Infrastructure Development Project Investment Evaluation



In a project validity analysis, the national transport DB was utilized extensively. With the territory extension project's preliminary validity survey' between Miryang-si and Cheongdo in April 2001, in which the transport DB was first provided, this has constantly increased with five cases in 2003, 15 cases in 2004, and 56 cases in 2010.

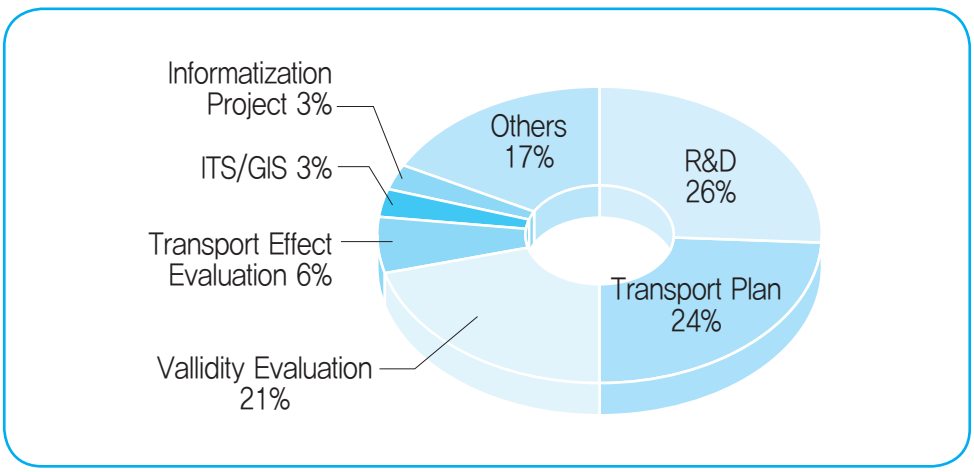
Table 3-5 | Utilization of National Transport DB in Yearly Validity Analysis

Year	2001	2003	2004	2005	2006	2007	2008	2009	2010	Total
Number of Cases	1	5	15	22	32	27	40	37	56	235

3.2.3 Other Utilization

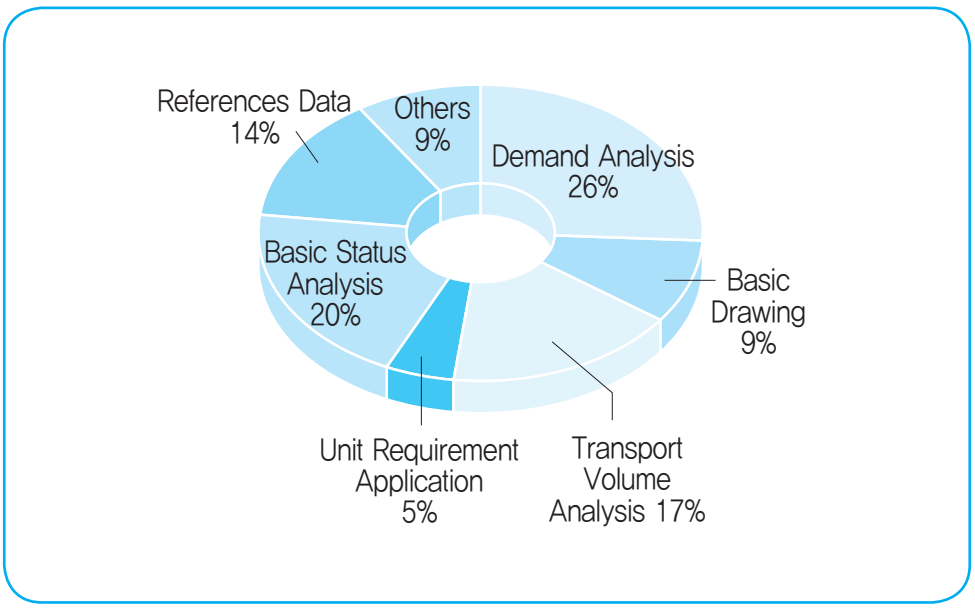
The national transport DB is used in a variety of sectors, in addition to validity evaluation. Examples include academic research such as papers, research and development projects, ITS projects, transport effect evaluation, etc. [Figure 3-3] shows a summary of DB utilization examples by objectives, as of 2010. It mainly consists of research and development, including academic research, followed by the transport plan and validity evaluation.

Figure 3-3 | National Transport DB Utilization Objective Analysis



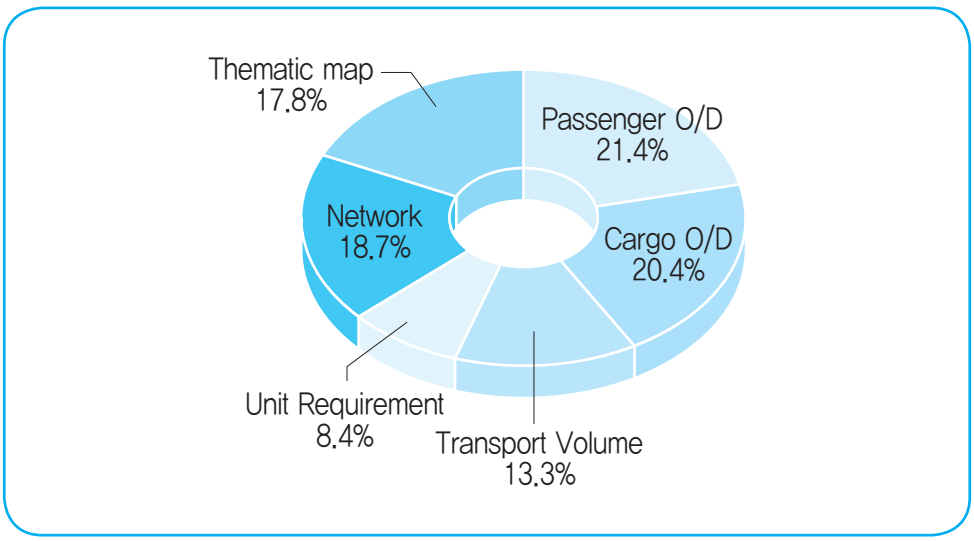
[Figure 3-4] shows the classification on the utilization type of national transport DB. It mostly consists of transport demand analysis, basic status analysis and transport volume analysis.

Figure 3-4 | Analysis of National Transport DB Utilization Methods



[Figure 3-5] shows which of national transport DB are utilized significantly. Since it considers detailed analysis data as targets, basic statistics via homepage, etc. were not aggregated. Since the majority of detailed analysis data are used in the transport demand analysis, passenger O/D transport volume, freight O/D transport volume and network for transport analysis take up the largest portions. According to the recent growth of space information projects, the use of transport thematic map as basic data for those projects has also shown to be utilized extensively.

Figure 3-5 | National Transport DB Utilization Rate by Sector



2011 Modularization of Korea's Development Experience
Construction and Utilization of National
Transport Database

Chapter 4

Project Promotion Methods

1. Problems and Resolutions of Project Implementation
2. Project Evaluation

Project Promotion Methods

1. Problems and Resolutions of Project Implementation

1.1 National Transport DB Foundation Stage (1998~2003)

During the initial stage of the transport DB Construction project, deteriorated efficiency caused by the absence of a capable workforce and medium-term/long-term plans surfaced. Since this project was performed as an informatization employment project, as part of unemployment measures until 2000, most of the project budget was used as personnel expenses as a public employment project. As a result, adequate effort to increase accuracy and reliability of data in the initial project period could not be provided, and the overall project operation efficiency was also lowered. Moreover, inefficiency of the unemployed workforce and employment limit on technical professionals incurred low quality and reliability of data during the initial phase of the project. As the survey was continued, a considerable amount of effort made to amend this problem, which in turn caused problems on the overall efficiency of the project. Despite these efforts, limitations associated with the initial survey data could not be completely overcome, and a sharp improvement was proposed in 2005.

Next, the project plans and directions were insufficient, and the basis for continuity was also lacking due to the absence of medium- and long-term plans on the transport DB project. Therefore, due difficulties in securing researchers and DB projects, there has been too much emphasis on O/D transport volume table and network. As a solution, the national transport DB's informatization strategy plans, in addition to mid- and long-term national transport survey plans, are required.

Finally, reliability problems concerning the DB project's products have been brought up. During the initial project stage, the O/D transport volume table and network as the transport DB project's main results achieved early outcomes, while being stably utilized as basis materials for the survey project of a preliminary feasibility study. However, problems with not only this year's survey, but next year's as well, have been raised.

1.2 Reliability and Utility Enhancement of Transport DB (2003~2007)

In the project development stage, the survey was performed as a public labor service, and problems with reliability were posed; therefore, in the 2005 regular survey, it was proposed that enough prearranged plans and survey professionals would be sufficiently utilized. During this stage, the transport survey guidelines for survey standardization were established. In addition, survey materials were designed to have coherent form, with the establishment of the foundation for cooperative utilization.

During this stage, directions and plans were established by devising the informatization strategy plans of the national transport DB (2006). Moreover, the first national transport survey plan (project in 2008, settlement in August 2009) as the mid and long term plan was prepared. As a result, the project became systemized and the outline of continuity reservation was arranged.

Since the beginning of project, problems with the national transport DB construction project's range and the local self-governing agency's task range were brought up. Capital was not included in the rage of national transport DB project, and the national transport DB project were not agreed upon, which were both addressed during the inspection of the Board of Audit and Inspection (2009). Moreover, except in the area of capital, other local self-governing agencies' O/D policy-making project was not continuously implemented, which caused the inconvenience of utilization. In order to resolve these problems, in 2010, from survey to analysis in association with local self-governing agencies including the capital area through matching funds, cooperation with local self-governing agencies was proposed. In addition, the grounds to sequentially cooperate and implement the policy-making project were established.

Nevertheless, problem with reliability have continuously recurred. In response, the national transport DB inspection team, a separate external agency, was composed of industry-university-institute experts. The inspection team sent members into every field of passenger survey, freight survey, network, statistics, system and project management. They also prepared a system closely to inspect the whole process, from national transport survey to DB construction. This inspection system has been applied since 2008.

1.3 Extension and Reliability Enhancement of Transport DB and Procurement of Professionalism in Project Implementation (2008~)

While the transport DB project has been developed for ten years, the problem was that it was stamped as an O/D construction project. As a result, the utilizability of the DB construction project was seen as limited. The national transport survey materials' free-of-charge release, the press release discovery approaching to the public, the DB construction result specification, etc. have therefore been brought up in the utilizability enhancement stage. Since the materials' free release has constantly been posed as a problem in the

past, it is also being addressed in the utilizability enhancement stage. For press releases approaching to the public, cases such as "how have Koreans passed for ten years?" are expected to be frequently released. Moreover, expectations for the utilizability of analysis results are increasing, and analysis specifications are being required from the existing city-county-borough analysis level to the town-township-street level. These kinds of demand require that drastic improvements be made to the DB construction project.

Finally, there are difficulties regarding the employment and training of high-quality research human resources. To improve the DB project's reliability and ease-of-use, it is necessary to create a base from which high-quality human resources can securely work. So far, a significant portion of human resources from the transport DB project have been covered with temporary workers. For appointment jobs, the position is unstable with a high turnover. Workers should be trained for an extended period to demonstrate a certain level of work capacity. Employment and training of research human resources continue to be an important issue, which needs to be addressed earnestly for the future.

2. Project Evaluation

As examined, Korea's national transport DB is working reliably, with a solid foundation. This is based on central government's solid efforts to implement and nurture the active cooperation of local governments and related institutions, by virtue of which the DB construction project is being pushed forward aggressively. Efforts to establish the national transport DB is contributing to the advancement of Korea's transport sector, including the establishment of a collection system for fundamental transport statistics, the construction of a basis for a reasonable transport policy evaluation, etc.

The project established a collection system for fundamental statistics data in the national transport sector, together with implementation of the national transport DB. As a result of performing numerous regular and unscheduled surveys on domestic passenger and freight sectors for more than 10 years (starting from the government's public employment project in 1998 to 2011), the basis for fundamental statistics on transport characteristics of passengers and freights was accumulated. Later, changes in the contents and scope of the transport survey were required in response to changes in domestic and international circumstances, such as the emergence of green development. To cope with these changes, the government reflected related survey items, such as green indices, energy, environment, etc. into related laws, so that relevant data could be collected. The project also improved the compatibility of survey data, by dictating through creating and publishing transport survey guidelines that various individual transport surveys could use to follow a standardized survey method. It also established five-year national transport survey plans (Phase 1, September 2008), thereby improving the collection system for fundamental survey data, based mainly on regular surveys.

A reasonable evaluation basis for transport policy was arranged through the implementation of a national transport DB. The government sets up and enforces pre- and post-evaluation system, such as the validity analysis, to establish transport infrastructure investment evaluations and other transport policy. The primary objective of this project is to provide fundamental data required for these evaluations, which are derived from the national transport DB. As such, it continues to produce passenger/freight O/D transport volume, including future predictions, network for transport analysis, and social economic statistics data. It also improves survey and analysis methods by continuing research on enhancing data reliability, and sets up and opens to the public the data sharing system via the Internet, so that data can be utilized for research/analysis in the private sector as well. Through these efforts, it fosters public-private transport investment research and analysis, including research on the transport sector in academia, and as well enhancing the validity of evaluation results.

The main reason that the national transport DB has steadily developed for the last 10 years and enlarged its utilization range was because of the government's active and steadfast interest. As the starting point, caused by the absence of a transport DB, the national transport DB construction plan was established. Through the first five-year plan, foundation for a transport DB was formed, and then through the second five year plan, improvements in DB reliability were pursued. Moreover, the government's budget, through national informatization progress, played a significant role as well. Hereafter, there still are shortcomings that need to be addressed, such as the domestic transport performance's statistical data organization and transport analysis methodology's constant revision. Improvements, such as survey implementation from the planning stage for the national transport DB construction, legal and administrative supports for project promotion, specialized agency appointment management for research analysis, and cooperative use through DB release need to continue to be evaluated, as they get implemented for the current national transport DB and its continued development.

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Related Articles in Integrated National Transportation Efficiency ACT

Integrated National Transport System Efficiency Act	Integrated National Transport System Efficiency Act Enforcement Ordinance
Article 12 (National Transport Survey) ① In order to efficiently establish and accomplish national transport policies such as national mainstay transport network plans and middle investment plans, the Minister of Land, Transport and Maritime Affairs should do research on national level transport survey (the rest, "national transport survey") by presidential decree. ② For national transport survey and for the efficient transport survey's implementation and share of the results to prohibit the duplication of individual transport survey under the item 1, Article 16, the Minister of Land, Transport and Maritime Affairs should establish national transport survey plans considering national transport survey's objectives and strategies, detailed survey's contents and methods and all that sort of things after the deliberation of national transportation board every five years. ③ For the good of national transport survey or the purpose of national transport survey plans establishment under the item 2, the Minister of Land, Transport and Maritime Affairs may ask the submission or support of necessary data. In this case, a head of public institution should follow this except by special reasons.	Article 8 (National Transport Survey Enforcement) ① As stated by the first clause of Article 12, the Minister of Land, Transport and Maritime Affairs should do research on national level transport survey (the rest, "national transport survey") according to the each following provision section. 1. Routine checkup : towards the whole country every five years 2. Unscheduled checkup : implement for the purpose of supplementing routine checkup of item 1 or in case of need to investigate on specific areas or specific items ② In national transport survey, the following items should be included. 1. Registration and utilization by every means of transportation 2. Supply and management reality such as routes, transport volume, mileage by every means of transportation and by each facility of transportation 3. O/D transport volume of passenger and freight by every means of transportation and by each facility of transportation 4. Transport and distribution cost of transport use and transportation facilities' investment, management and administration 5. Transport-related social external costs such as transport congestions, traffic accidents, environmental pollution, greenhouse gas emissions caused by transport distribution activities 6. Energy consumption and efficiency by every means of transportation 7. Greenhouse gas emissions by every means of transportation 8. Transportation record and division rate by every means of transportation and by every facility of transportation 9. Additional necessary details for transport -related policies and plans' establishment, transportation facilities' investment analysis and evaluation

Integrated National Transport System Efficiency Act	Integrated National Transport System Efficiency Act Enforcement Ordinance
	Article 13 (National Transport DB Council Organization) ① National DB Council under Clause 17.5 (the rest, "National DB Council") consists of no more than thirty members including a chair and a vice-chairman. ② The chairman of National Transport DB Council is appointed by the Minister of Land, Transport and Maritime Affairs among public and senior officials in the Ministry of Land, Transport and Maritime Affairs, and the vice-chairman is appointed by the Minister of Land, Transport and Maritime Affairs among forth-level and higher level officials tin the Ministry of Land, Transport and Maritime Affairs. ③ National Transport DB Council chairman represents National Transport DB Council and directs the duty. ④ In National Transport DB Council, there will be an assistant administrator who deals with National Transport DB Council's office work, and the assistant administrator will be recommended among the staff members of the Korea Transport Institute according to 「the Law Considering the Establishment, Management and Development such of a Government-Supported Research Institute」 and nominated by the chairman of National Transport DB Council. ⑤ National Transport DB Council's members will be appointed by the Minister of Land, Transport and Maritime Affairs while corresponding to the next following items. 1. A person who is appointed by the head of public agency, among forth-level and higher level officials in related government agencies, metropolitan city, megalopolis, province, or special self-governing province 2. A person who is recommended by the related head of public agency and appointed by National Transport DB Council's chairman under Clause 2.18, among the public agency staffs from Article Ga to Article Da 3. A person who has specialty and experience in transport survey or transport-related data's DB establishment, and who is recommended by the National Transport DB Council's chairman ⑥ Under Clause 5.3, the appointed member's term is two years.

Integrated National Transport System Efficiency Act	Integrated National Transport System Efficiency Act Enforcement Ordinance
	Article 14 (Meetings) ① The chairman of National Transport DB Council calls National Transport DB Council's meetings and becomes the chair. ② The National Transport DB Council's meetings are classified into annual regular ones and extraordinary ones held in case the chairperson admits the necessity. Article 15 (Agenda) National Transport DB Council discusses and adjusts the next each following item. 1. Connection and cooperation of transport survey and data collection 2. Connection system between national transport DB and collected data from public agency's individual transport survey results 3. Efficient supply and share plans of transport survey data 4. Task improvement such as the standardization of transport surveys and national transport DB establishment methods 5. Improvement plans of national transport DB's utilizability 6. Overlap prevention plans among transport surveys 7. Additional necessary facts to establish and manage national transport DB Article 16 (Rules for Operation) In addition to the regulations in this, any other necessary facts for National Transport DB Council's organization and management are determined by the chairman of National Transport DB Council through National Transport DB Council's meetings.
Article 13 (Transport Run's Temporary Halt Measures, etc.) ① When performing national transport survey, the Minister of Land, Transport and Maritime Affairs may make officials take a step of one of the following items. 1. Temporary halt of vehicles' run such as cars 2. Current status study on passenger or freight in transportation such as cars 3. Access toward transportation facilities, temporary utilization and installation of transport survey equipment	

Integrated National Transport System Efficiency Act	Integrated National Transport System Efficiency Act Enforcement Ordinance
4. Access to or utilization of others-owned land besides transportation facilities (in case with approval of landowner, land possessor or manager) 5. Beside that, any measure for transport survey determined by presidential decree ② The official who takes measures under the item 1 should hold a token to indicate authority and show this to whom it may concern	
Article 15 (Transport Survey Guidelines) ① In order to ensure transport survey's objectivity and unity, the Minister of Land, Transport and Maritime Affairs should prepare and notify the guidelines concerning transport survey (the rest, "transport survey guidelines"). ② So as to establish the transport survey guidelines, the Minister of Land, Transport and Maritime Affairs should discuss with the head of relevant administrative agency in advance. ③ The application range, methodology, included basic facts and any other necessary details of transport survey guidelines are determined by presidential decree.	Article 9 (Contents of Transport Survey Guidelines) ① The transport survey guidelines by the clause 1, article 15 (the rest, "transport survey guidelines") should include the following each fact. 1. The kind, item and period of transport survey 2. The object, method and process of transport survey 3. The system of transport survey 4. The total, analysis, distribution, DB construction and management of transport survey results 5. Any other necessary items for efficient transport survey ② In the event of National Transport Survey, individual transport survey pursuant to the item 1, Article 16 or cooperative transport survey pursuant to the item 1, Article 11, the head of public agency should enforce according to the transport survey guidelines.

※ Reference: National Transport Demand Survey and DB Construction–Related Provisions

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