A Study on the Development of the Road Statistics Information System (RSIS) for e-Government in Korea

Jae-Kyu Lim, Byung-Kon Kim, Seok-Won Lee, Jeong-Kyu Park

***Abstract*—**Ministry of Land, Transport and Maritime Affairs (MLTM) in Korea developed an information system for the Yearbook of Road Statistics which is the records about the annual road extension statistics to support a policy decision reasonably and scientifically. This system enables government official to gather the data rapidly and to provide the tailor-made statistical data for e-Government. In this paper, we suggested developing a method of e-Government system by analyzing the workflow for the existing Yearbook of Road Statistics, and making out the computerization method.

***Keywords*—**e-Government, Web Application, Applications of e-commerce service, Construction IT, Road Statistics, Road Management, Road Database

I. Introduction

At present time, in 21st century, the information technology (IT) industries are growing more rapidly, therefore the rates of demands regarding the accurate and rapid statistical information are increasing. Hereupon, at Korea Ministry of Land, Transport and Maritime Affairs (MLTM) in Korea, they publish the Yearbook of Road Statistics regarding to present condition of the road which is fluctuating in every years by investigating the extension and paving rates of roads in terms of years, cities, lanes and different types of pavements.

The Yearbook of Road Statistics is being used as a major national statistics when the decision of policy for Social Overhead Capital (SOC) is made. However, the way of the present manual aggregate has less reliability and consistency of the data since the rate of the operator's reliance is high and with the excessive time demanding (Aggregate starts on December, publish on May in the following year) the person in charge will be overburdened. Especially, the ways of manual aggregate and confirmation using the Excel file face the difficulty with pursuing and checking errors, also take excessive time on publishing the Yearbook. To overcome these critical points, to provide the accurate and quick data collection and timely suitable statistical data and to enhance the utilization, Road Statistics Information System (RSIS) is needed. Thus, in this paper, we suggested developing a method of the system for the Yearbook of Road Statistics which is developed to cope with the demand of utilization of information on present condition of road.

Jae-Kyu Lim is with the Highway Research Division, SOC Research Institute, Korea Institute of Construction Technology, Senior Researcher, (phone: 82+31-910-0572; fax: +82-31-910-0031; e-mail: jklim@kict.re.kr) .

Byung-Kon Kim is with the ICT Convergence and Integration Research Division, SOC Research Institute, Korea Institute of Construction Technology, Senior Researcher, (phone: +82-31-910-0042; fax: 82+31-910-0031; e-mail: bkkim@kict.re.kr).

Seok-Won Lee is with KGI(Korea Geographic Integration) Co., Ltd., Deputy head of department, (phone: +82+32-260-7330~3; fax: +82-32-260-7334; e-mail: lswain73@gmail.com).

Jeong-Kyu Park is with the Road Management Division, Road Bureau, Ministry of Land Transport and Maritime Affairs Republic of Korea, an executive secretary, (phone: +81-44-201-3918; fax: 81+44-201-5591; e-mail: kgo00258@korea.kr).

II. Establishment of Computerization on RSIS

In this paper, the RSIS was developed with the purpose of improving the data utilization and efficiency of work, through the systematization of gathering the data on the Yearbook of Road Statistics which is a major national statistics.

In Figure 1 below, it illustrates the conceptual diagram on the RSIS. The data of present condition of road is gathered along the input and verification line in real time, from the existing Excel switching system with the internet and RSIS. At each road management agencies, they are planned to input relevant present condition of road according to the given authorities.

Fig. 1 Conceptual diagram on the RSIS

For the smooth uses of the RSIS, the present condition of road has to be inputted within the Road Act and Road Regulation, and work of inputting will be operated under the chosen ways and processes at the RSIS.

Figure 2 below, it shows the workflow of modification according to the establishment of the RSIS. For the input of the present condition of road, the excel that worked for previous year is no longer needed, and verification and input of the present condition of road is conducted through the system in automatically.

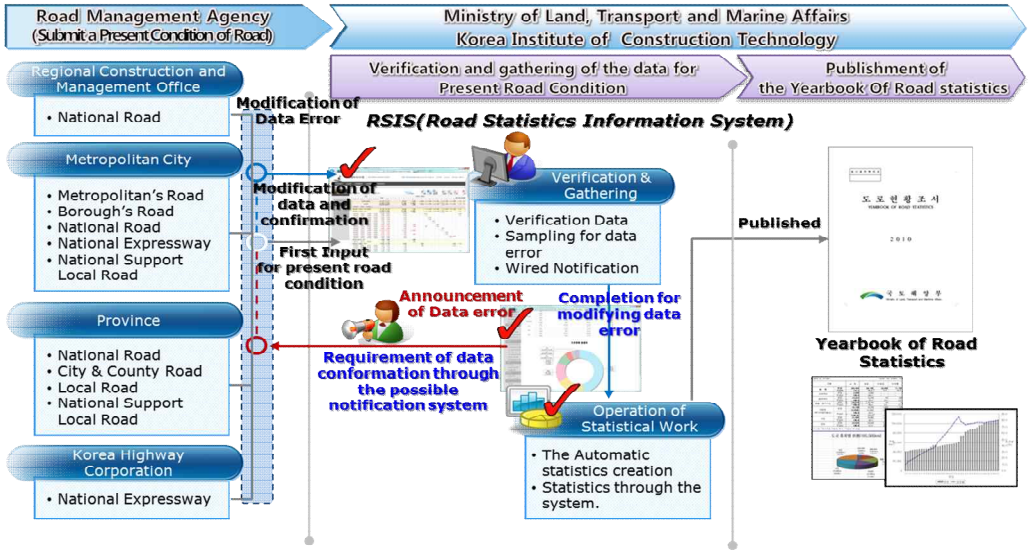

Fig. 2 The workflow according to the development of RSIS

When the setting of input period and data input are required at the MLTM, this will be entered into the stages of data's input. After the verification and drawn up of individual data are completed, at each road management agencies, they submit those verifications and drawn up to senior class of road management agencies, and then they verify it. The document that contains the aggregation steps declares the statistical data that has formed in automatically, by passing through the verification at Korea Institute of Construction Technology (KICT) and revision at Ministry of Land, Transport and Maritime Affairs (MLTM). Road Management Agency, the major users of the system of Yearbook of Road Statistics is classified into managers, road management agency (metropolitan cities) which is main agent of managing the road and the road management agency (town, gun, borough) that are main agent of inputting the present condition of road. The code which is used to classify the road management agency uses the organization code as one of the standard administration codes that is related to notification of Ministry of Public Administration and Security. To set up the relationship between the management of Road Management Agency and the input of Road Management Agency, the information that is for expressing the level of users and information that has possibility of knowing the higher authorities will be added.

To avoid the errors occurred with the ways of inputting the detailed sections and sections of roads by the users, code of administrative district which is determined by law for Ministry of Public Administration and Security will be used and this code will aids to calculate the statistical data in units of the administrative districts

1	2	3	4	5	6	7	8	9	10
4	1	2	8	7	1	0	4	0	0

Metropolitan City/Province | City/County/ Borough | Eub/ Myeon/Dong | Ri

Fig 3. Composition of road's distance code

A Fig. 3 shown above illustrates the compositions of code that shows the road's distances. This code reduces the errors of inputting with the encoding of each section and the detailed sections of the start and end points. As a code that unifies the existing ways of inputting, when the distance is in land mark not in administrative district, preferentially, the code of administrative district which is determined by law for a place located by geographic features have to be inputted, after that, a name will be inputted by utilizing the remark column.

The overlapped sections for road routes are classified into input of overlapped section for bottom routes and input of the intersection for top routes. However, since the many overlapped sections are existed, it has to be ensured that it is capable of inputting dozens. Intersections are inputted by classifying to entry depend on the endpoint. At this stage, the level of the road and route numbers will be selected. These will be used to check the interaction of the data of the overlapped sections.

III. Development of Rsis

RSIS was comprised in terms of the management of road management agency, route management, input of the present condition of road and statistics of the present condition of road. Figure 4 shows the menu compositions which is needed for input of present condition of road in System of Yearbook of Road Statistics.

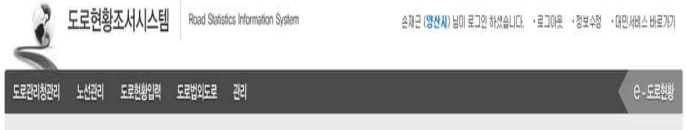

Fig. 4 Menu Composition for RSIS

A. Management of Road Management Agency

The System of Yearbook of Road Statistics authorizes the existing accounts by altering the Road Management Agencies (metropolitan cities) where used to receive data of present condition of road, to the management agency in Road Management Agencies. Management Agency in Road Management Agency authorizes the accounts and authorities to Input Agency in Road Management Agency to input the present condition for each level of roads. Figure 5 is the screen that shows the management of Road Management Agency. Ministry of Land, Transport and Maritime Affairs, Ministry of Public Administration and Security, Korea Highway Corporation are managed as Road Management Agencies, and Chuon-An Non- San Expressway is managed as Agent of Private Investment.

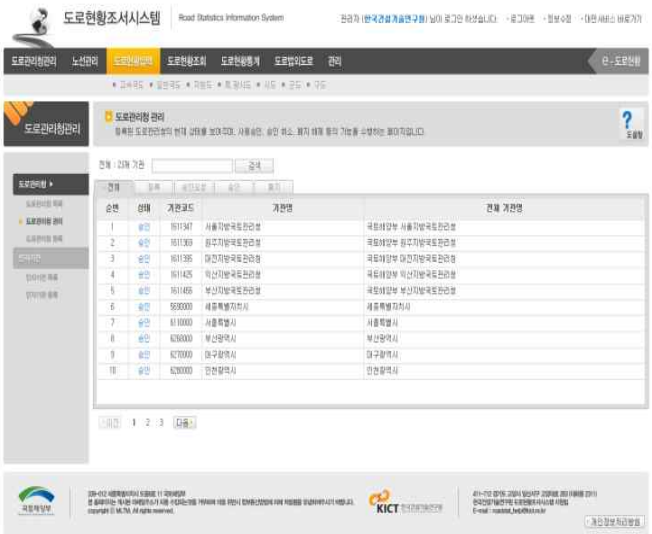

Fig. 5 Management of Road Management Agency

B. Route Management

Input of the present condition of road regarding system of Road Management Agency starts from the route's management. Through the function of route management, the routes of each types of road are produced to input the present condition of road. Figure 6 illustrates the progress of operating the function of route's management. Metropolitan cities, cities and provinces and towns have to update the existing route's information and have to fulfill the producing works. The reason for this action is that, in the existing Yearbook of Road Statistics, mostly, only statistics for extension of administrative district have to be drawn up. In the system of Yearbook of Road Statistics, it gives the keynote of managing the extensions for each type of routes and crossroads depending on Road Act Number 8 to gain the precise management of present condition of road.

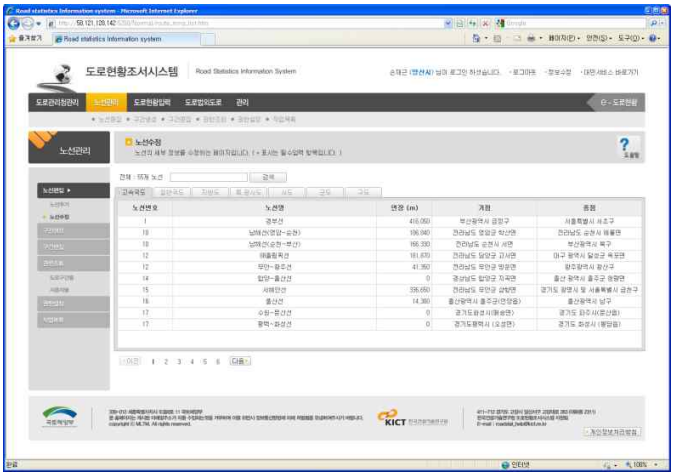

Fig. 6 Route Management

C. Section Management

When the routes for each types of road are produced, production of huge sections is required for each types of route. Production of huge sections is operated at the management agency of Road Management Agency and at the each level of road management agencies, possession of the authority will be decided according to the huge sections. Figure 7 shows the function for managing the sections for each types of route. To input the data of present condition of road, at least two sections of starting point and ending point have to be registered. Metropolitan cities, cities, provinces, and the others that have not inputted, have to produce new sections.

Fig. 7 Section Management

D. Input of Present Condition

Unlike drawing up the data of present condition of existing road, the input of present condition of road registers the specific sections of the basis of the administrative district that is determined by law regarding to acquire huge sections. Afterward, it is operated in terms of inputting the extensions for

each crossroad. The input of present condition of road for basis of the administrative district that is determined by law has the objective of procuring the accuracy of statistic of present condition of road. The inputs of the landmark such as Ma-An three-way intersection are being operated through the input of remark. In Figure 8, it shows the application of entering the present condition of road.

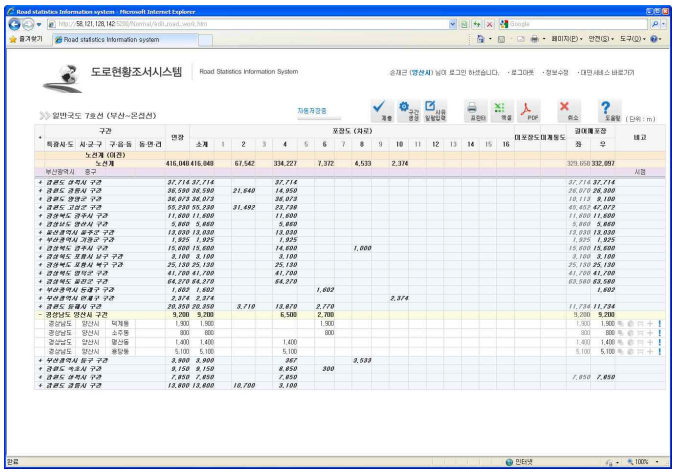

Fig. 8 Input of Present Condition

E. Statistics of present Condition of Road

When input of the present condition of road is completed, the statistics of present condition of road are produced. Figure 9 shows the all-inclusive table in statistic of present condition of road.

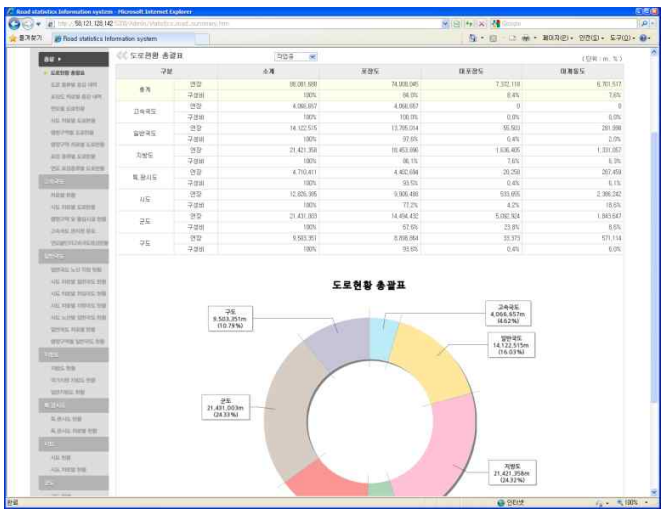

Fig. 9 Statistics of Present Road Condition
(Summary Table for Present Road Condition)

Also, the statistics of present condition of road are produced on mobile devices. Figure 10 shows statistics of present condition of road on mobile devices.

Fig. 10 Statistics of Present Road Condition on mobile devices

IV. Conclusion and Expected Effect

Through this paper, computerization method for the Yearbook of Road Statistics has been drawn, and the system was built up depends on these processing. The work of the Yearbook of Road Statistics that was handled individually by the Road Management Agencies will be inputted on the internet by the development of the RSIS.

By this method, the work will be managed in a short time with the accuracy, therefore, information offering and information sharing which are became typical through the systematic management for the data of present condition of the roads will be possible.

This will be expected to assist on decision analysis for policy decision maker, also for this, it is fully expected to have work efficiency.

Acknowledgment

This study was performed as a part of the project of Ministry of Land, Transport and Maritime Affairs (MLTM) in Korea, “A Study on the Development of the Road Statistics Information System”, so therefore acknowledges and thanks for its support.

References

[1] Ministry of Land, Transport and Maritime Affairs (MLTM) in Korea, “2011 Yearbook of Road Statistics”, 2012

[2] Ministry of Land, Infrastructure, Transport and Tourism (MLIT) in Japan, “Road Statistics”, http://www.mlit.go.jp/road/ir/ir-data/tokei-nen/index.html

[3] Young-Jin Kim, Byung-Kon Kim, Jae-Kyu Lim, “A Study on Computerization Method for the Yearbook of Road Statistics”, The 37th Conference of the KIPS (Korea Information Processing Society), Vol. 19, No. 1, 2012, pp. 1271-1274.

[4] Jae-Kyu Lim, Seok-Won Lee, Young-Jin Kim, Byung-Kon Kim, Hyun-Jin Shin, “A Study of Improving Pavement Data Management System of National Highway”, The 38th Conference of the KIPS (Korea Information Processing Society), Vol. 19, No. 2, 2012, pp. 1746-1749.