

GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES A STUDY ON ANALYSIS OF THE EFFECT OF MOBILE ROAD PROBLEM REPORTING SERVICE

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ABSTRACT

The Ministry of Land, Infrastructure and Transport has been providing Mobile Road Problem Reporting Service (MRPRS) since March 2014 so that people can report their complaints regarding the use of road through the smartphone app. Under the circumstances, this research aims to examine the necessity for and performance of MRPRS and prospect the future trend of road problem reporting through the service. Compared to 2013 when the MRPRS was not developed, the number of reports received doubled now, which means that a social demand for road service is increasing. It is deemed that the MRPRS will be of a great help to minimizing the inconvenience felt by the people in using road.

Keywords: *Mobile Road Problem, National Highway, Annual Report*

I. INTRODUCTION

Recently, frequent inclement weather and aged road are the cause of accidents on the road. For example, the number of traffic accidents by pothole has increased to 1,051 in 2013, about five times more than 209 cases in 2008. Road management agencies use road managers to reduce road traffic accidents, but it has limitations due to limited budget and manpower. Another way for the efficient management of road is to recognize and lessen the danger through the participation of road users. Road management agencies have operated Road Customer Service Center so that people can report complaints arising from using the road by phone or online, but it was less effective than expected due to some problems. First, only a few people knew how to report; second, even if calling, it was difficult to talk with the person in charge; and lastly, the use of intuitive materials such as images and videos was impossible.

A large number of incidents taking place on the road threaten the safety of enormous road users, but it is difficult to promptly respond to the incidents with a limited number of road managers. In addition, road users has experienced difficulties in reporting the inconvenience on the road because of the absence of an integrated channel for reporting, lack of knowledge in reporting procedures, and difficulty in finding the phone number of the competent road management agency and describing the location of inconvenience while being on the road. However, recently people overcome the difficulties by using advanced IT technology and smartphone. The use of smartphone in public sector is a good example. As of October 2010, smartphone subscribers in Korea exceeded 5 million, the minimum number for popularization, and in 2015, the penetration rate of smartphone reaches 80% in Korea. In addition to conventional functions of phone, smartphone has been expanding its functions and features which are applied in diverse fields and its influence on people's lives well be increasing more. People use smartphone for information search, business, banking, shopping and leisure. In line with the change, public institutes including the government have been launching a variety of public apps to provide people with public services in the mobile environment. The Ministry of Land, Infrastructure and Transport has been providing Mobile Road Problem Reporting Service (MRPRS) since March 2014 so that people can report their complaints regarding the use of road through the smartphone app. Under the circumstances, this research aims to examine the necessity for and performance of MRPRS and prospect the future trend of road problem reporting through the service.

II. NECESSITY FOR ROAD PROBLEM REPORTING APPS

The total length of roads in Korea has been increased from 56,000km in 1990 to over 100,000km in 2004. According to the Ministry of Land, Infrastructure and Transport, the total length of roads in Korea reached 105,703km as of the end of 2012, equivalent to 2.6 times the circumference of the Earth. Most of expressways, national highways, metropolitan highways, and local highways and 60% of urban roads and rural roads are paved. Among the entire roads, ratio of paved roads is nearly 80%. The Korean road management system is highly complicated. For example, expressways are operated by Korea Expressway Corporation (52 branch offices), while metropolitan highways, local highways, and urban and rural roads are run by competent local governments (175 cities and counties). National highways are operated by competent regional agencies, but in urban and rural administrative districts, the competent city mayor or country governor is responsible for road management.

Table 1. Road Statistics in South Korea

Division	Road management agency	Length (km)	Paved length (km)	Pavement (%)
Expressway	Korea Expressway Corporation	3,860	3,860	100.0
National Highway	Minister of MOLIT	13,812	13,474	97.6
Metropolitan Highway	Metropolitan City Mayor	18,879	18,764	99.4
Local Highway	Provincial Governor	18,180	14,978	82.4
Urban Road	City Mayor	27,005	18,486	68.5
Rural Road	County Governor	23,829	14,634	61.4
Total		105,565	84,196	79.8

Road management agencies have put large budget and manpower each year to maintain and enhance the performance the responsible roads. However, all the problems occurring on the all roads cannot be perfectly resolved due to the limited resources, and therefore, reporting of road users is essential for identifying road problems. As the road management system is complicated, road problem reporting system is not simple accordingly. A road user can report a road problem or inconvenience by calling the competent road management agency or using app. For example, road problems with national highways shall be reported to Ministry of Land, Infrastructure and Transport (080-0482-000), while road problems with expressways shall be reported to a call center at Korea Expressway Corporation. Furthermore, problems with metropolitan highways, local highways, and urban and rural roads shall be reported through the inconvenience reporting service (app) provided by the Ministry of the Interior and Safety. However, road users did not have knowledge of the app operated by the competent road management agency or phone number, and even if the road user found the phone number and reported, it was not easy to talk with the responsible person. This problem occurred because of lack of an integrated channel for reporting, through which people can easily report their complaints. Complicated reporting procedure restricts road users from reporting their complaints, resulting in leaving road problems, thereby decreasing road performance while increasing risk of accidents. Therefore, a user-friendly and streamlined integrated reporting system should be established to maintain the best performance of each road and ensure the safety of road users.

III. OPERATION OF MOBILE ROAD PROBLEM REPORTING SERVICE (MRPRS) AND ITS RESULTS

Launched in March 28 in 2014, the MRPRS was used by about 4,000 people as of July 2014. For entire roads in Korea, 4,400 cases of road problems were reported, and among the reported cases, 80% has been resolved. This section describes the effects of the MRPRS. The purpose of the service is to help general road users to easily and conveniently report road problems, and the competent road management agency to deal with the reported problem in a timely manner. In a broad sense, the service aims at establishing safer road ecosystem by identifying and resolving road problems that have not been addressed due to the limited resources (budget and manpower) of the existing road management agencies. This research analyzed reporting database for the last three months (April 1 to June 30) by region and reporting type. Spatial scope for the analysis of service effects was limited to national highways, but similar-pattern results were expected for the entire roads. National highways refer to a total of 13,000km of arterial roads (collectors) operated by five land agencies and 18 national highway offices under the Ministry of Land, Infrastructure and Transport.

Participation of road users in road management started in 1997 and at that time, the users mainly used a 080 call to Road Customer Service for the management of national highways. Figure 1 shows the growth of the number of reporting problems with national highways since 2004. The growth had been moderate until 2011, but the number sharply increased in 2012 when many local governments launched their own online reporting service to receive complaints from people (apps, Twitter, Facebook, etc.). Among the reported complaints, many road-related problems were included.



Figure 1. Annual Road Customer Reports for National Highway

For three months since the MRPRS started, the number of road problems reported regarding national highways was 1,181 (\approx 393/month). In 2013, a total number of road problems reported to Road Customer Service including 080 calls was 2,314 (\approx 192/month). However, the number of road problems reported doubled in 2014 compared to the preceding year. It is deemed that easy and convenient reporting procedure of MPRPS through simple operation in the smartphone allows an increasing number of road customers to participate in road problem reporting. In addition, the reported problems are immediately delivered to the responsible person so that handling time can be reduced, which results in the enhancement of road performance and safety along with the increase of road customers' satisfaction.

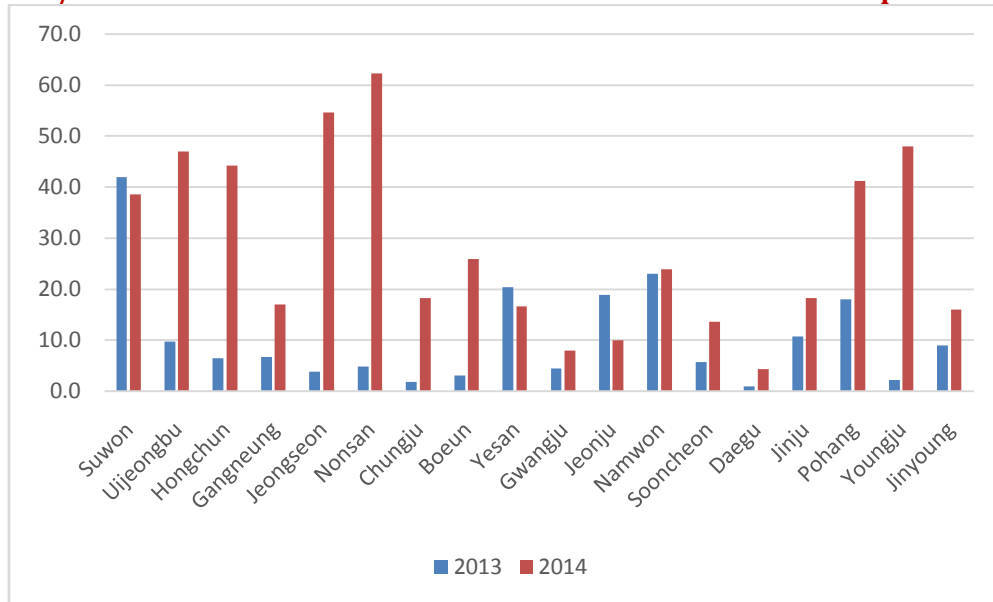


Figure 2. Average Monthly Reports by Regional Office

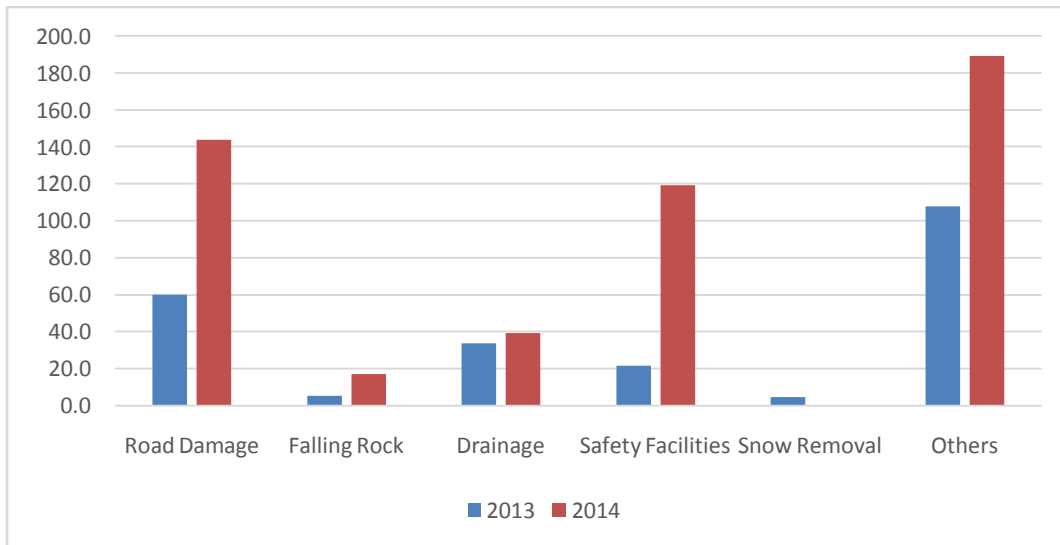


Figure 3. Average Monthly Reports by Report Type

By comparing the number of road problems reported between 2004 and 2013 and that reported in 2014 following the launch of the MRPRS, the effects of MRPRS were analyzed. The number of reporting had slowly increased until 2011 but soared in 2012 and 2013. It is deemed to be because in 2012, many local governments started to provide online services through their own app, Twitter or Facebook to receive people’s complaints including inconvenience arising from the use of road.

Table 2 Number of Road Problems Reported Each Year

Year	Number of reports
2004	1,220
2005	1,244
2006	1,213
2007	1,497
2008	1,370
2009	1,437
2010	1,639
2011	1,594
2012	2,504
2013	2,791

In the research, the number of reports in 2014 was estimated with a polynomial trend line under the assumption that the MRPRS has not yet introduced, and the estimated number of reports was 3,205. As the number of road problems actually reported in 2014 through MRPRS was 4,018, the net number of reports thanks to the introduction of the MRPRS was calculated to be 813, a 25% increase with the adoption of the MRPRS.

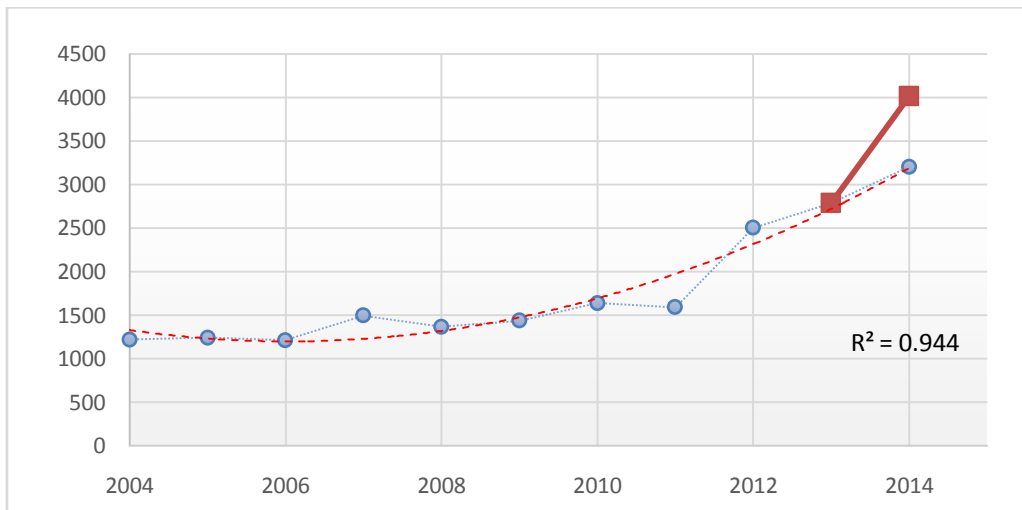


Figure 4. Estimated Annual Road Customer Reports

IV. CONCLUSION

The Mobile Road Problem Reporting Service (MRPRS) was developed to help road customers to easily and conveniently report problems taking place on the road, and road agencies to handle the reported problems within 24 hours. With the MRPRS, there is no need to find the competent authority among many road management institutes, and instead, the road user can report and share the results with simple operation of smartphone and also participate in policy making through satisfaction evaluation.

Compared to 2013, before the development of the MRPRS, the number of road problems reported has nearly doubled since the adoption of the reporting service. That means social demands for road service become stronger

and more sophisticated. At this time, the MRPRS is considered to be of a great help to reducing inconvenience of people in using road service.

Already deeply connected to our lives, smartphone is not only a means to make a call, but also an enabler making seemingly impossible things possible. Amid the increase of logistics and frequent bad weather, road can threaten life of road users. In response to the danger, direct reporting of road problem through smartphone will increase the participation of road customers, and it will be connected to road management system, thereby establishing a safer road environment. In this regard, active promotion for the MRPRS is required, and timely handling of the problem and notification of the results are also important to make a virtuous cycle in establishing a favorable environment for road users to report road problems. The MRPRS is expected to make a great contribution to minimizing inconvenience arising from the use of road and forming a safe and convenient road environment.

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