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An Analysis of User Satisfaction with delivery type of Traffic Information

[1]Chang-gyun Roh, [2] Bumjin Park*

[1]Senior Researcher, Korea Institute of Civil Engineering and Building Technology, Korea

[2]Senior Researcher, Korea Institute of Civil Engineering and Building Technology, Korea

ABSTRACT

The medium of traffic information service has been limited to VMS in ITS of a public side. However, traffic information is being provided in a variety of devices with the recent spread of smartphones. Unlike in the past when one-way information was provided at a certain point, drivers are currently provided with real-time traffic information they want anytime, anywhere using smartphones. In this regard, this study analyzed the effects of a change in the providing medium on the traffic information service, and thus to set directions for the future traffic information service. The analysis results confirmed that VMS has its utilization as a traffic information providing medium for users who do not have individual terminals such as smartphones, but its effects are expected to be greater when installed in a path transition point or a major point with focus on information about traffic situations. Accordingly, it is expected that the findings of this study will be helpful in configuring the traffic information supply system and setting directions for its utilization in the introduction of the future ITS systems or the improvement of the existing systems.

Key Words: User Satisfaction, Traffic Information, Delivery Types, Survey

1. INTRODUCTION

Intelligent Transport Systems (hereafter referred to as ITS) are aimed at increasing the flow capacities of roads by stabilizing the traffic flow as advanced systems applied to roads for efficient and systematic management of the roads. In addition, they aim to enhance driver's comfort through the provision of traffic flow status information, and rapid detection and response to the incidents based on the continuous monitoring system using CCTV footage information collection systems.

Unlike in the past, many changes have occurred in a system for providing traffic information. In times past, the system was limited to VMS and internet, whereas changes in use patterns are

currently occurring due to a rapid increase in the use of smartphones. Therefore, an analysis on the user satisfaction is required.

In this regard, this study sought to analyze the user satisfaction by performing a qualitative research utilizing a survey on the behaviors, including major use media and satisfaction with traffic information provided for main arterial road users in Seoul. Towards this end, the survey was conducted on main arterial road users in Seoul, and the results derived from a total of 101 survey responses, excluding questionnaires with insincere answers, such as mark duplicates and unmarked items, were summarized, where the basis to select 100 as a sample size is as follows. Since the road users, who are the subjects of the survey, are drivers that use the roads on which the Seoul main arterial road traffic management system is installed, they virtually apply to infinite population. Therefore, a statistical analysis was conducted through the minimum sample size determination, and the sample size from the survey of users was calculated based on the minimum sample size determination methods for

the infinite population. The methods and results are as follows.

2. $$\text{Minimum sample size}(n) \geq \frac{1}{\left(\frac{e}{k}\right)^2 \frac{1}{P(1-P)}} \qquad (1)$$

where, population size N =100,000 (traffic volume, estimated))

required accuracy e=0.1

The reliability of the survey was set to 95%, and the survey sample size calculated based on the required accuracy was 100 people (minimum sample size n=97, e=0.1). On the basis of this, the survey was conducted, and the questionnaires, excluding the insincere answers to the items of the response results from the collected questionnaires were selected for analysis. For the survey, online and offline researches were performed, and only the people who have transport-related occupations were surveyed in the online research in order to improve the reliability of response results from the survey. The survey date, gender, age and occupational distribution of the 100 survey respondents are shown in Table 1, the purpose of using the roads is shown in Figure 1.

Table 1 Configuration of Survey Respondents

	Contents	
Date	June 7, 2013 ~ June 14, 2013 (7 days)	
Methodology	Online (transportation associates) and offline (interview) Survey	
Gender	Male : 49.5%	Female : 50.5%
Age	20s : 12% 40s : 33%	30s : 40% 50s+ : 15%
Job	Officer : 32% Business : 36% Housewife : 21%	Self-employed : 5% Student : 4% Others : 2%

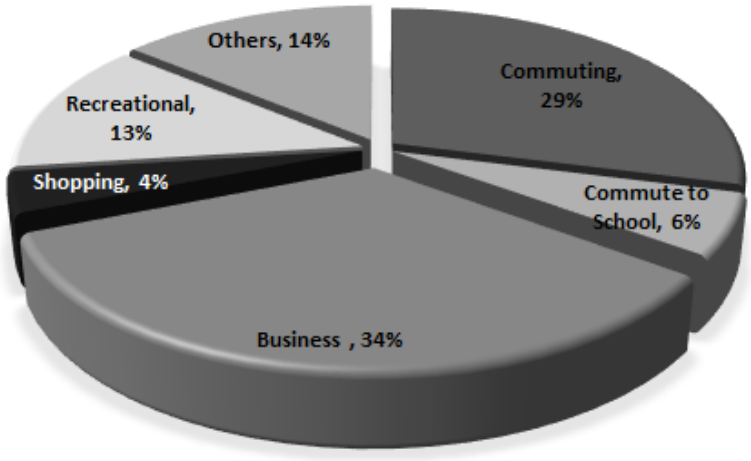

Figure 1 Distribution of Trip Purpose

2. ANALYSIS OF SURVEY RESPONSES

1) VMS UTILIZATION

As in Figure 2, 76% of drivers were found to use a VMS to see traffic conditions ahead, and in other cases, the VMS was used for the prediction of arrival time (17%) and acquisition of detour route information (3%). However, since the VMS is not clearly visible on the actual roads (43%), and it is difficult to intuitively understand the provided traffic information (14%), there were cases where the VMS has not used well. In addition, 14% of respondents said that since the information they want is not immediately displayed, they use other media rather than the VMS located on the roads as shown in Figure 3.

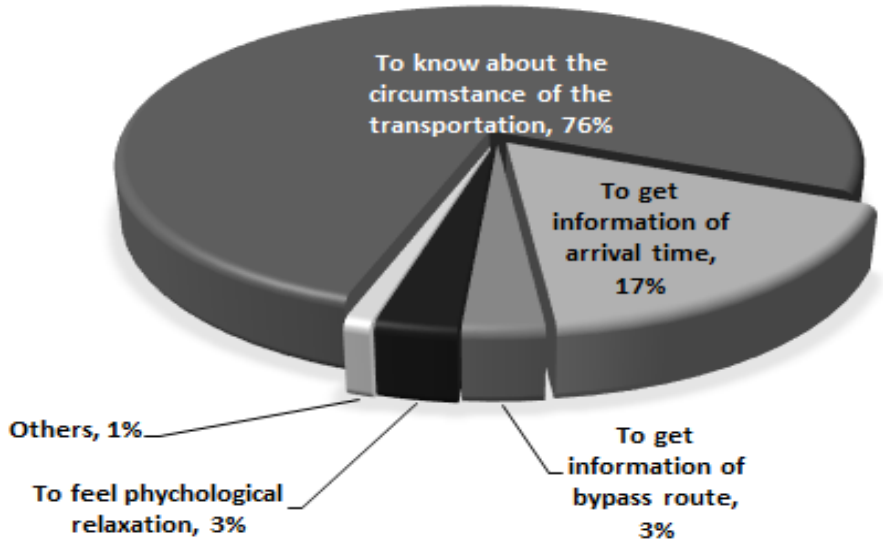

Figure 2 Reason of Using VMS

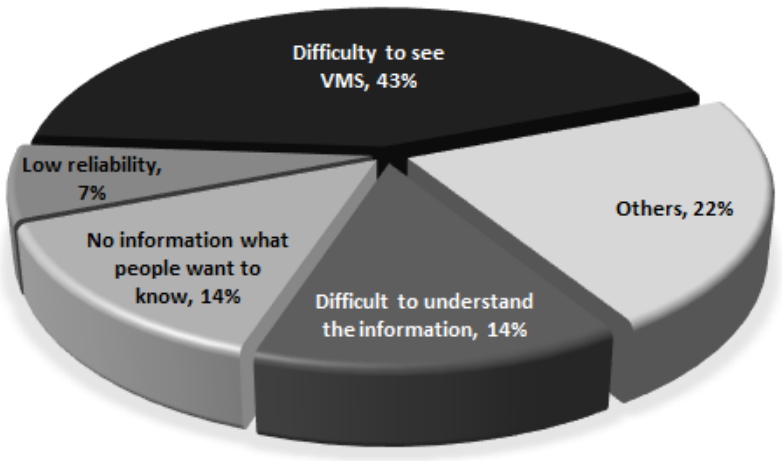

Figure 3 Reason of NOT Using VMS

2) VMS ENFORCEMENT EFFECTS

Based on the survey results, the degree of helpfulness felt by users was converted into 1-5 points ranging from 1 (not helpful at all) to 5 (very helpful) points as shown in Equation (2), and then calculated by a method for obtaining the arithmetic mean.

$$\text{Helpful Score} = \frac{\begin{array}{c}(\text{Very helpful votes}\times 5+\text{Helpful votes}\times 4\\ +\text{Normal votes}\times 3+\\ \text{Not votes}\times 2+\text{Not at all votes}\times 1)\end{array}}{100} \quad (2)$$

The comprehensive results are presented in Table 2 and Figures 4-9. The survey results showed that the information through the VMS gives the largest help in the identification of traffic conditions(3.97), followed by the provision of psychological stability (3.56), and the determination of detour routes(3.53).

Table 2 Degree of Helpful with VMS

	Very Helpful	Helpful	Normal	Not Helpful	Not at all Helpful	Degree of Helpful
	1	2	3	4	5	
Reduced travel time	5	9	44	28	15	3.39
Reduced Accident	7	24	41	15	14	3.05

Psychological stability	6	9	30	34	22	3.56
Cognitive of traffic situation	3	5	17	43	33	3.97
Cognitive of Alternate Path	3	11	35	33	19	3.53
Cognitive of Additional Information	8	14	37	25	17	3.29

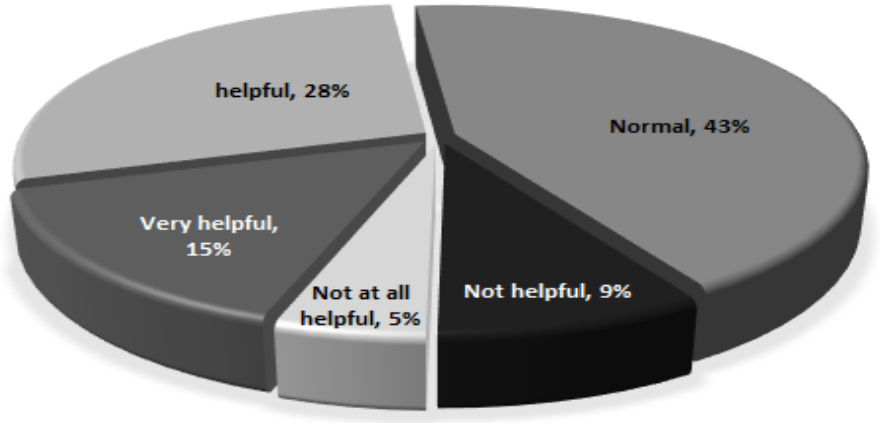

Figure 4 Impact of Reduced travel time

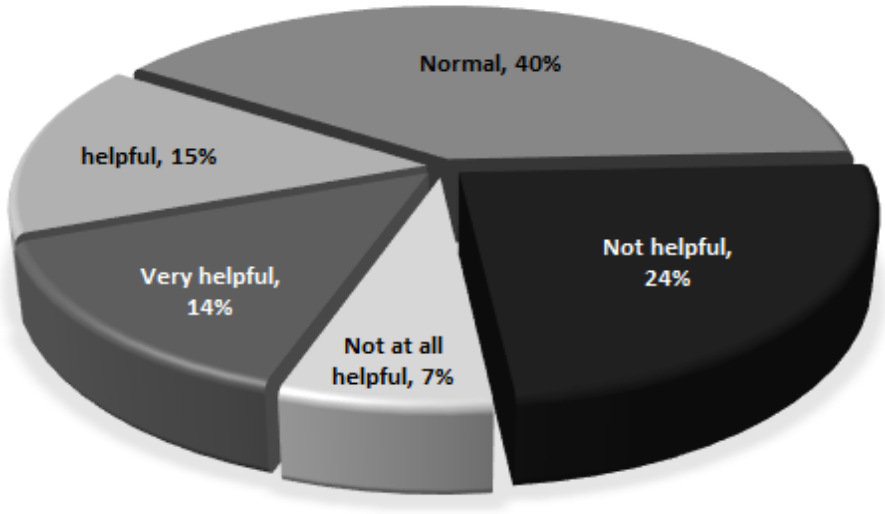

Figure 5 Impact of Reduced Accident

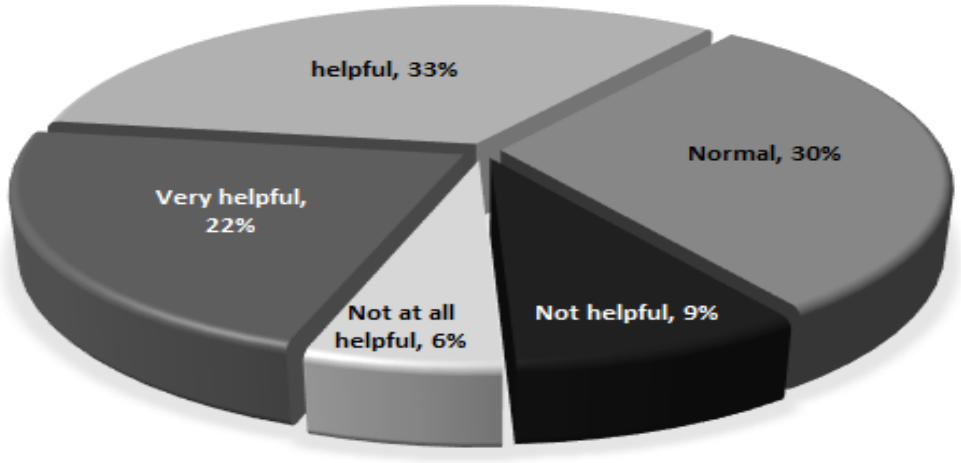

Figure 6 Psychological Stability During Operation

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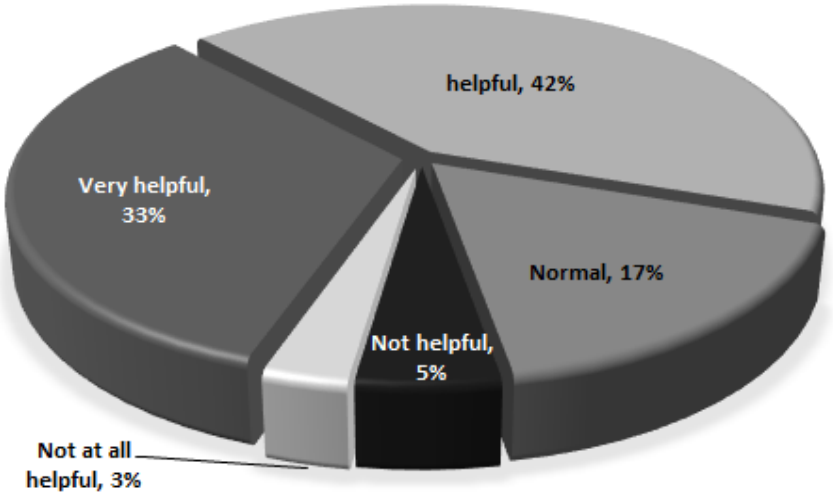

Figure 7 Cognitive Effects of a Traffic Situation

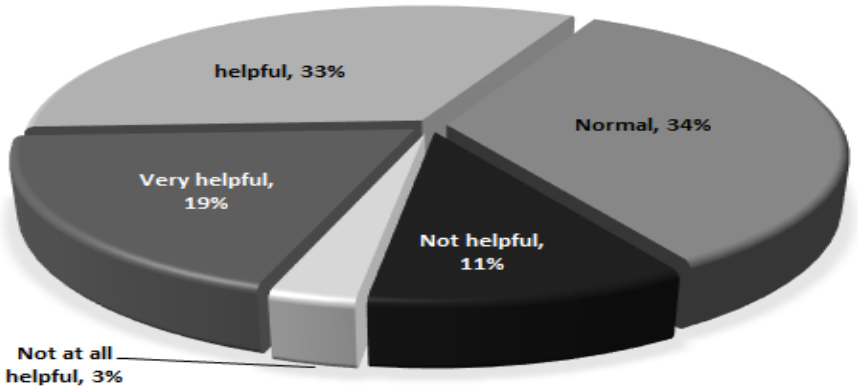

Figure 8 Cognitive Effects of Alternate Path

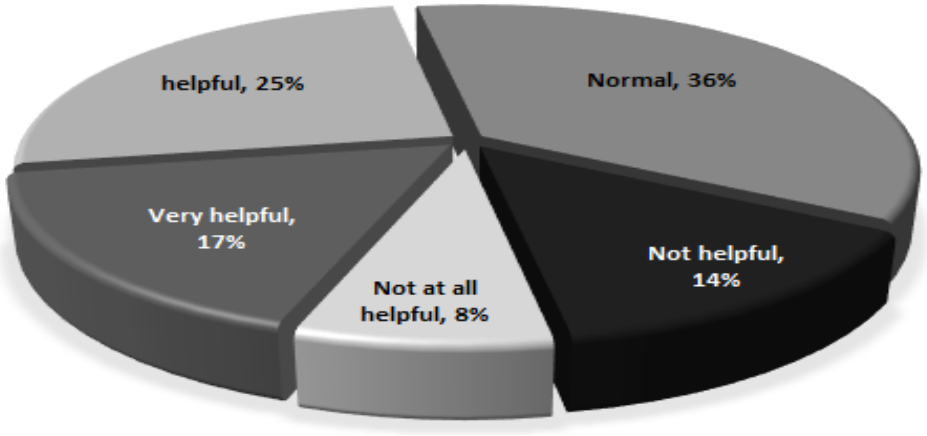

Figure 9 Cognitive Effects of Additional Information

3) VMS RELIABILITY ANALYSIS

The traffic information provided by the VMS is largely divided into three types, such as estimated time, incident information, and delay and congestion section information. Of these, the estimated time was investigated to check the degree of reliability on the information provided by the VMS. The largest number of respondents (35.6%) said that it was 'normal', but 58.8% of users said that it was 'reliable (33.7%)', and 'very reliable (24.8%)' as Figure 10 and Table 3, which indicates that the users were found to rely on the estimated time information among those provided by the VMS.

On the other hand, the degree of reliability on the incident information showed higher reliability than that of the estimated time information as the percentages of respondents who said that it was 'reliable' and 'very reliable' were 40.6% and 27.7%, respectively. These results are presented in Figure 11.

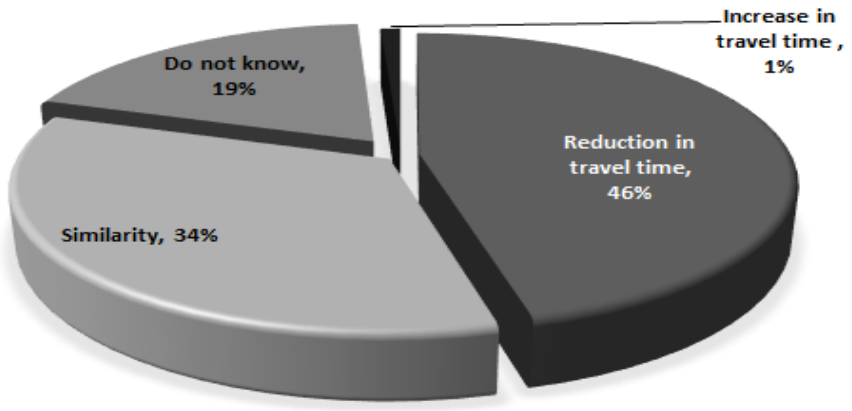

Figure 10 Travel Time Changes for Switching the Route by VMS Information

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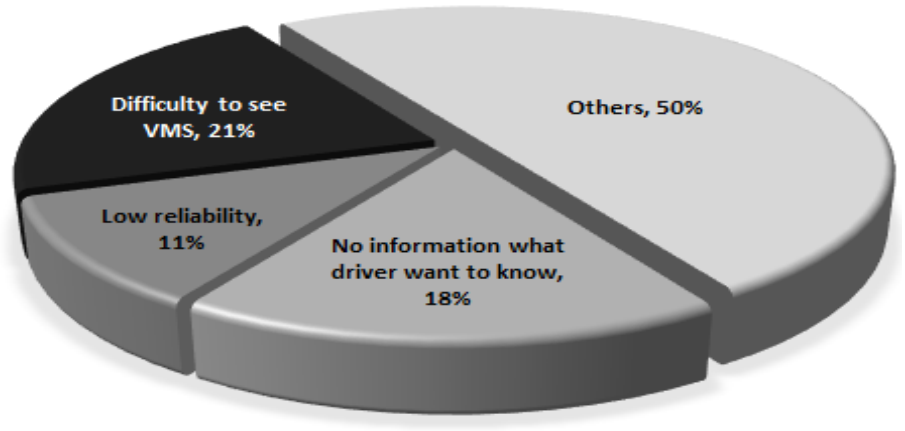


Figure 11 Reason of NOT Change the Route

Table 3 Reliability of VMS

	Very Helpful 1	Helpful 2	Normal 3	Not Helpful 4	Not at all Helpful 5	Degree of Helpful
Estimated Travel time	2	4	36	34	25	3.75
Incident Information	1	6	25	41	28	3.88
Delays and congestion information	0	3	18	45	35	4.11

3. Commonly Used Media

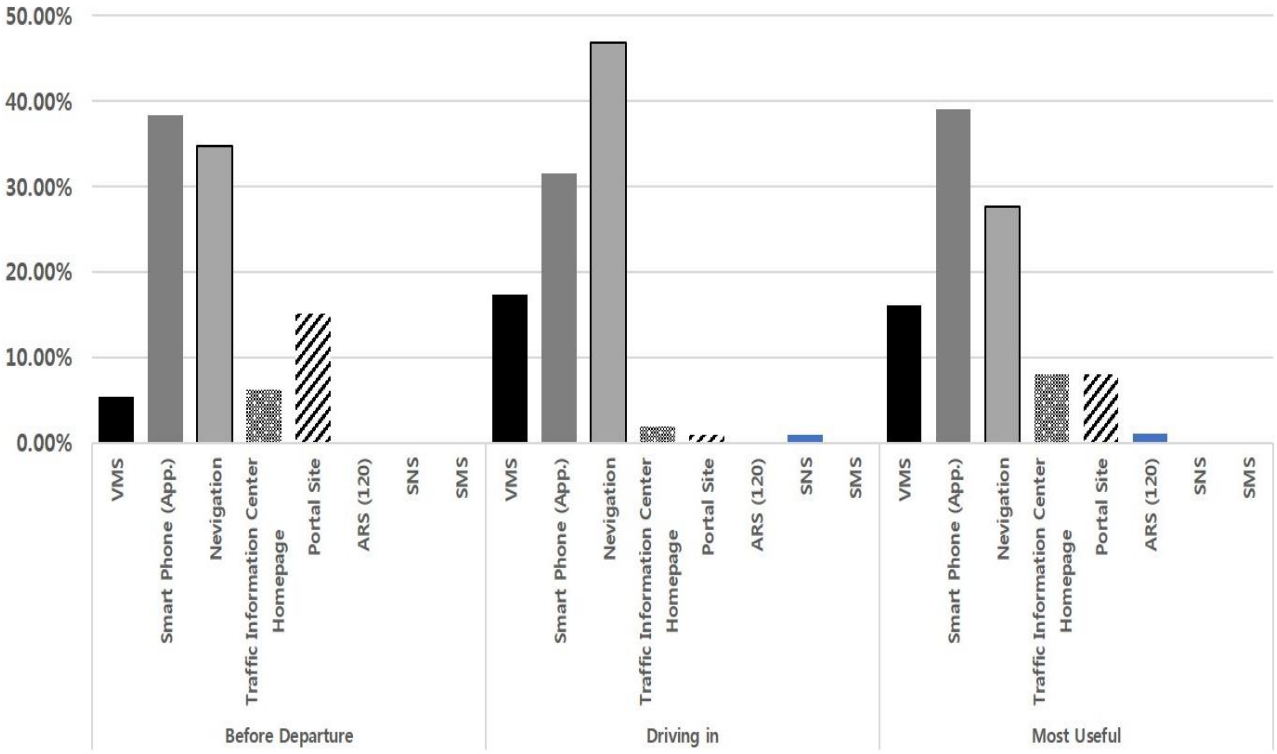
Survey results of commonly used traffic information media are as following Figure 12. In the acquisition of traffic flow information, the dependence on VMS was very high among drivers. However, the findings of the current survey showed that navigation systems (46.6%) and traffic information applications of smartphones (31.6%) are most favored by drivers.

On the other hand, only less than 20% of drivers were found to use VMS located on the road, which is similar to the case of the medium used to identify traffic information before driving a car. This indicates that there are diversified media to help obtain the road conditions, and the

Figure 12 Commonly Used Media

media was also changed to its present form of an individual terminal. Navigation systems was most used information media while driving

4. CONCLUSION



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Acknowledgments

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